In compliance with the
Canadian Privacy Legislation
some supporting forms
may have been removed from
this dissertation.

While these forms may be included
in the document page count,
their removal does not represent
any loss of content from the dissertation.

University of Alberta

A Home in the Upper Athabasca Valley: The Aboriginal Homesteaders in the Nineteenth Century

By

Patricia Gayle Bailey ©

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Master of Arts

Department of Anthropology

Edmonton, Alberta
Fall 2003

National Library
of Canada

Acquisitions and
Bibliographic Services

395 Wellington Street
Ottawa ON K1A 0N4
Canada

Bibliothèque nationale
du Canada

Acquisisitons et
services bibliographiques

395, rue Wellington
Ottawa ON K1A 0N4
Canada

Your file Votre référence
ISBN: 0-612-87565-2
Our file Notre référence
ISBN: 0-612-87565-2

The author has granted a non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of this thesis in microform, paper or electronic formats.

L'auteur a accordé une licence non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de cette thèse sous la forme de microfiche/film, de reproduction sur papier ou sur format électronique.

The author retains ownership of the copyright in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

L'auteur conserve la propriété du droit d'auteur qui protège cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou aturement reproduits sans son autorisation.

Canadä

University of Alberta

Library Release Form

Name of Author: Patricia Gayle Bailey

Title of Thesis: A Home in the Upper Athabasca Valley: The Aboriginal Homesteaders in the Nineteenth Century

Degree: Master of Arts

Year this Degree Granted: 2003

Permission is hereby granted to the University of Alberta Library to reproduce single copies of this thesis and to lend or sell such copies for private, scholarly, or scientific research purposes only.

The author reserves all other publication and other rights in association with the copyright in the thesis, and except as hereinbefore provided, neither the thesis nor any substantial portion thereof may be printed or otherwise reproduced in any material form whatever without the author's prior written permission.

University of Alberta

Faculty of Graduate Studies

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled: *A Home in the Upper Athabasca Valley: The Aboriginal Homesteaders in the Nineteenth Century* submitted by Patricia Gayle Bailey in partial fulfillment of the requirements for the degree of Master of Arts.

Dr. E. Higgs, Supervisor

Dr. M. Evans

Dr. P. Murphy

April 17, 2003

Dr. H. Lewis

Abstract

The interaction between the Aboriginal homesteader community and the vegetation structure of the landscape of the Upper Athabasca Valley during the nineteenth century was examined. A range of sources from historical documents, ecological studies, the 1915 Bridgland and 1998-1999 repeat photographs, and oral traditions were incorporated. The 1915 and repeat photographs were interpreted for vegetational structure history. Maps of landscape patterns during the nineteenth century were developed based upon the collected historical, oral and ecological information. The fire disturbance history was synthesized and interpretations made about the influence of the Aboriginal homesteader community on the fire regime of the Upper Athabasca Valley during the nineteenth century. The results of the work may help to understand the affects of human land management practices on the landscape history of the Upper Athabasca Valley.

Acknowledgements

This thesis has been a momentous event in my life, and it could not have been accomplished without the help, advice and assistance of many people. First, and foremost, I am indebted to my supervisor Dr. Eric Higgs for his patient encouragement, support and the many challenges he posed me in the winding and sometimes difficult trail that became my thesis. The integrity and quality of Eric's work and dedication to scholarship are a life-long inspiration. Thank you.

Rachelle MacDonald and Mary Desjarlais of the Aseniwuche Winewak Nation are owed a deep debt of gratitude for your willingness to help and guide me, and to speak to me about the history of the AWN in the Upper Athabasca Valley. Mrs. Desjarlais' knowledge, history and stories were intrinsic to this project and my thesis could not have been completed without her. Thank you for your help and your time. The Bridgland project provided financial support to this project and gave permission to use the historical and repeat photographs of the Upper Athabasca Valley, without the use of which my project would have been weakened.

Mom and Dad without you two I would not be here at all (in more ways than one!). Your love, support and encouragement kept me going. Dad, our conversations about fire, ecology and people have inspired me since I was a little girl. You lit the first match! Thank you Mom and Dad.

Dr. Henry Lewis and his fascinating stories and depth of research, knowledge and interest in Aboriginal fire ecology was essential not only to this thesis, but also initially inspired my interest in the ability of Indigenous communities to create, manage and maintain their landscapes and the social institutions that kept the ties between people and ecology strong. Thank you for your presence, knowledge and advice. The support and timely advice of my co-supervisor, Dr. Mike Evans, was vital to this project and much appreciated by me. Dr. Peter Murphy and our conversations about forest fire history, landscape history and the human use of fire filled in a lot of holes in my thinking. Your gentle encouragement refined this project immensely. Dr. Charlie Schweger and Dr. Ray LeBlanc were consistently there to help guide me, ponder and talk through ideas.

There are many friends that provided a lively and challenging academic environment and helped me think things through, maintain my sanity, and have a little fun in the process. Melanie, Claudio, Jenaya, Lisa, Lori, Gaby, Craig, Lise, Denise, Julijia, Caroline, Jeanine, Laura, Kate, Serena, and Cora. Thank you all – you enrich my life.

To my sister and brother-in-law, Pam and Curtis, and my brother Paul, you are great siblings! Your support and the generously provided ears I could bend with tales provided encouragement that kept me going. Thank you.

The support and joie-de-vivre of the Department of Anthropology is legendary and I am especially grateful to Gail Matthews, Dr. Forth, Joanne MacKinnon, Liz Jobagy and Robin McClelland for their administrative support and general encouragement.

Table of Contents

1. Introduction

1.1 The Study..2
1.2 Methods and Sources.................................. 6

2. Changing Institutions; Changing Landscapes

2.1 Introduction..11
2.2 Wilderness History..12
2.3 Parks Canada: "The Playground of the World".........16
    2.3.1 Tourism Support..16
    2.3.2 Management Paradigms........................... 19
        2.3.2.1 Fire Policy 22
    2.3.3 Parks and Aboriginal People...................... 24
        2.3.3.1International Relations between Aboriginal Communities and National Parks.........................27
2.4 Jasper National Park..29
    2.4.1 Culture, Ecology and Restoration in JNP.........31
        2.4.1.1 Vegetation Composition Research 34
2.5 Ecological Anthropology...35
    2.5.1 Traditional Ecological Knowledge..................37
    2.5.2 Traditional Fire Use and Management............38
    2.5.3 Systems Theory and Sentient Ecology............41
2.6 Historical Ecology and Ecological Restoration..........44
2.7 Discussion..47

3. The Upper Athabasca Valley in the Nineteenth Century

3.1 Introduction...50
3.2 Characterizing the Ecological Process.........................51
    3.2.1 Macro Processes..51
    3.2.2 Montane Ecology of Jasper National Park..........52
    3.2.3 Fire Ecology...55
    3.2.4 The Fire Ignition Controversy............................58
    3.2.5 Prescribed Fire Program in Jasper National Park...61
3.3 Aboriginal History in the Upper Athabasca Valley................64
    3.3.1 The Long View of Human Activity in the U..............64
    3.3.2 Nineteenth Century Aboriginal History...................67
    3.3.3 The Aboriginal Homesteaders 72
    3.3.4 The Exodus from Jasper National Park................77
3.4 Discussion...79

4. Were People Important? Understanding the Dynamics of Vegetation Change

4.1 Introduction...83
4.2 Vegetation Composition of the Upper Athabasca Valley.........84
4.3 Repeat Photograph Pairs...91
4.4 Fire History of the Upper Athabasca Valley.........................112
    4.4.1 Aboriginal Fire Records for the Upper Athabasca Valley......113
    4.4.2 Fire History Research Studies..................................117
    4.4.3 Historically Observed Fires..126

4.5 Landscape Patterns in the Upper Athabasca Valley 1810-1870s...128-132
4.6 Discussion..133

5. Conclusion; Implications of the Changes in the Upper Athabasca Valley

5.1 Summary of Research Findings.. 136
5.2 Limitations of Study and Next Steps for Research.....................140
5.3 Recommendations for Future Research in Jasper National Park .142

List of Tables

Table 3-1 Grassland Community Types in Jasper National Park 53

Table 4-1 Fire History of Central JNP 117

Table 4-2 Fire Return Interval for Areas in JNP.................................122

Table 4-3 Landscape Level Fire Effects 123

List of Figures

Figure 1. Location Map and Key Features of Study Area in JNP 1

Figure 2. Map Layer 1 Upper Athabasca Valley 1810 to 1831................130

Figure 3. Map Layer 2 Upper Athabasca Valley 1858 to 1870's.................131

Figure 4. Map Layer 3 Upper Athabasca Valley Fire History.... 132

List of Plates

Plate 4-1a Photograph #672 Station Roche Miette.......................... 93

Plate 4-1b Photograph #672 Station Roche Miette..............................94

Plate 4-2 Photograph #568 Station Roche a Bosche..............................96

Plate 4-3 Photograph #508 Station Mt. Greenock..................................98

Plate 4-4 Photograph #308 Station Morro Peak..................................100

Plate 4-5 Photograph #467 Station Henry House..................................102

Plate 4-6 Photograph #471 Station The Palisade.................................104

Plate 4-7 Photograph #282 Station Roche Bonhomme......................106

Plate 4-8 Photograph #427 Station Mt. Henry..................................108

Plate 4-9 Photograph #247 Station Mt. Tekarra III...........................110

List of Abbreviations

AWN - Aseniwuche Winewak Nation
EM – Ed Moberly
FRI – Fire Return Interval
GM - George Moberly
HRV – Historical Range of Variation
IMW –Irene Mary Wanyandie
JNP – Jasper National Park
MD – Mary Desjarlais
MFRI – Mean Fire Return Interval
MM- Myles Moberly
RM - Roddy Moberly
UAV – Upper Athabasca Valley
VR – Virginia Rohatinsky

Appendices

Appendix 1. List of Native Plant Species in Upper Athabasca Valley 156

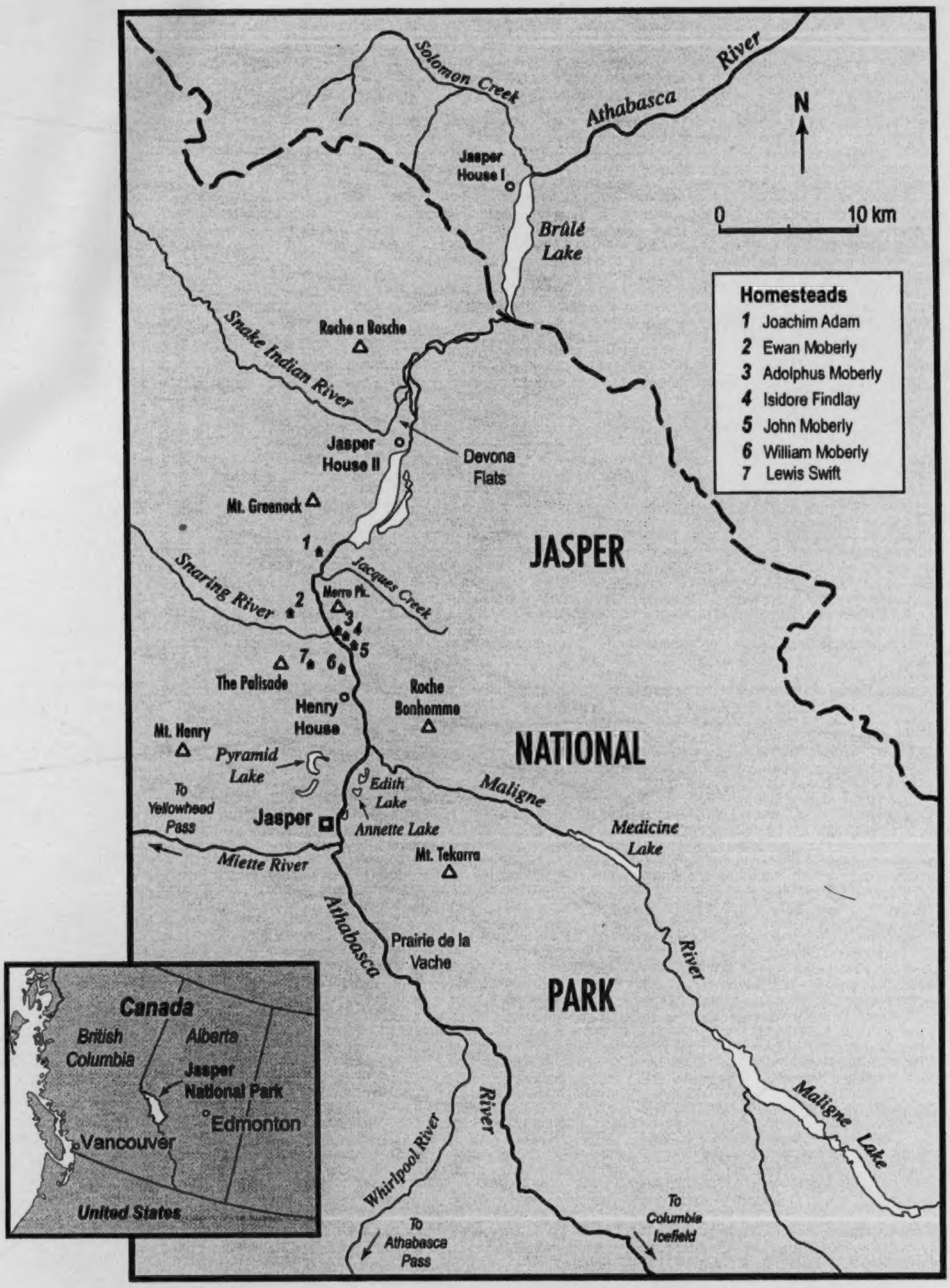


Figure 1. Location map and key features of study area in Jasper National Park. Courtesy of Michael Fisher.

Chapter 1. Introduction

1.1 The Study

The influence of humans upon the landscape is a feature of world history. Humans have planted gardens, manipulated the vegetation through the deliberate use of fire, invented irrigation and impacted the landscape in myriad ways for thousands of years. What influence did Aboriginal people have in the Upper Athabasca valley (UAV)? The influence of people on the landscape in the nineteenth century is outlined in ecological studies, historical records and oral traditions. The interpretation of these impacts is a central objective of this study. See Figure 1 for a location map and key features of the study area.

We know that the human history of this region began long before the establishment of the national park in 1907, as archaeological records show, the UAV has been occupied by humans for millennia. The nature of human occupation has changed significantly in the last century with the creation of Jasper National Park (JNP). Prior to the development of fur trade posts in the early nineteenth century the UAV was an important region for trade, resource harvesting and seasonal settlements for a number of Aboriginal[1] and First Nation peoples. The relative warmth of the valley, the variety of plants and animals in the region, and the travel routes into the land that became British Columbia to the west and Alberta to the east were important to the Aboriginal communities that used the region. For those groups west of the mountains, the Upper Athabasca Valley provided access to the important resources of the Great Plains. Similarly, for plains-dwelling Aboriginal people the coastal-interior region to the west supplied various resources, including salmon and a variety of edible plants.

The human communities in the UAV interacted with the landscape. To determine the form of these interactions during the one hundred years before park establishment was the challenge of this study. What was the UAV like in the nineteenth century? Was the appearance of the landscape different than it is today? What role did disturbances, like fire, play? Were people involved in the disturbance history? There were more frequent fires in the UAV during the nineteenth than in the twentieth century. How did the advent of the fur trade into the region affect the interaction of people with the landscape? The fur trade brought new economic choices, technologies and people into the UAV: access to iron, steel, guns, and faster methods of transportation; the immigration of Iroquois and other eastern Aboriginal peoples into the area, European explorers and traders, and new economic potential. The fur trade is one reason why the nineteenth century was unlike previous centuries in the region. Populations shifted, new communities came in and created both ties and rivalries with existing populations. Trapping and hunting for the fur trade were new uses of the UAV in the nineteenth century and became major forces in household economies. The vagaries of history impacted both the landscape and the human communities.

---

[1] I am using the term "Aboriginal" to refer to people that may also be called "First Nation" or "Metis". The AWN do not wish to be called "Metis" as they do not feel that this term reflects their identity as Aboriginal people, and they are applying for First Nation status. I am capitalizing "Aboriginal" to be consistent with the capitalization of "European".

This study is focused on the Aboriginal people that homesteaded in the UAV during the nineteenth century, until 1910. The study area is the low elevations of the UAV with the north boundary at Lake Brule and the south boundary above the confluence of the Whirlpool and Athabasca Rivers. I use the term "homesteader" to refer to this community, as this term reflects the connection between the people and the place through the prefix "home". The Aboriginal homesteaders lived in the UAV, built permanent houses and vegetable gardens, fenced in some productive grasslands, and viewed the UAV as their home. The establishment of a national park changed that relationship. After the creation of JNP, federal officials required the removal of the Aboriginal homesteader community from the Upper Athabasca Valley. Some of the families moved to Entrance while others moved to Grande Cache. The Aseniwuche Winewak Nation (AWN) of Grande Cache is the community to which the descendants of the Aboriginal homesteaders now belong. The name "Aseniwuche Winewak" reflects the connection of this community to the mountain landscape, as it means "Rocky Mountain people" in Cree (AWN, p. 4).

JNP is one of the largest Canadian national parks at 10,880 square kilometers (Holland and Coen, 1982); it lies in the Rocky Mountains in the province of Alberta, Canada east of the Continental Divide. It is a mountainous region intersected by numerous river valleys including the UAV that runs south to north and ultimately to the Arctic Ocean via the MacKenzie River. The Miette, Maligne, Snaring and Snake Indian River valleys are tributaries of the UAV. Altitude and climate are strong influences on the vegetation composition, and JNP includes the montane, sub-alpine and alpine ecoregions within its boundaries. The montane is found at low elevations ranging from 1000-1350 meters above sea level (ASL), the sub-alpine at 1350-2300 meters ASL, and the alpine at elevations above 2300 meters ASL (Westworth, 1988). The elevation range encompasses changes in vegetation physiognomy that result from topography and microclimatic influences.

Microclimatic variation is a factor in the composition of a landscape. Differences in elevation, slope, and soil type have consequences for the nature of the vegetation in a particular area. Such environmental variables directly influence ecosystems and reflect changes in landscape structure and ecosystem function on both coarse and fine scales (Chen, Saunders et al., 1999, p. 288). Differences in direction and angle of the sun impact the amount of moisture and heat an area receives. Microclimate influences the pattern of landscape change, impact of disturbances, use by wildlife and other factors.

The impact of microclimatic variation is illustrated in the UAV through the larger area of the montane ecoregion on south-facing slopes than on north-facing slopes, due to drier and warmer conditions. The vegetation composition in the lower elevations of the Athabasca Valley is largely that of the montane ecoregion, characterised by Douglas fir forests, shrublands and grasslands. Grasslands occur in the warmer and drier areas, marshes and fens in the wet areas, and forests in the more moderate areas (www.parkscanada.ca). Most of the grassland in JNP is in the low elevations of the UAV (Stringer, 1973, p. 385). An absence of fire, as well as increased moisture, favour the growth of trees over grasslands (Willoughby, 2001, p. 42). These local variations affect not only the vegetation composition, but also influence the range of animals and human occupation patterns. With its lower altitude and warmer climate, the montane is the ecoregion that provides much of the habitat for foraging animals and the predators that depend on them. The montane ecoregion represents approximately 8.5% of the area of JNP, or roughly 800 square kilometers (Higgs et al.,1999, p. 2, 14). The montane is also the ecoregion most suitable for human habitation, and where the majority of human use of the UAV, and human impact on the landscape, is located both past and present.

Landscapes are vital, adaptable places that adjust to different influences and occurrences. The landscape of the UAV today is different from the landscape of 100, 1000 or 100,000 years ago and will be different 100 years from now. The history of the landscape is the story of the myriad combination of influences at work in the area at different points in time. These influences include climate, humans, and disturbances like fire. The remarkable data set of 1915 Bridgland survey and 1998-99 repeat photographs of the central part of JNP is a vital source of information on landscape change in the UAV. Grasslands in these photographs are a more significant feature of the landscape than what is found in the area today. These photographs have been a key source of information for the vegetation composition in the UAV and the changes in that composition that accompanied the creation of the park. The changes in the UAV since Jasper National Park was created has been the focus of several previous studies (Tande, 1977, Rhemtulla,1999, MacLaren,1999, Higgs et al.,1999, and Higgs, 2002) which are incorporated in the present study.

The central focus of this study addresses change effected on the landscape: the loss of the Aboriginal homesteader community, and the twentieth century change in resource management practices in the UAV. In the first instance, when the Aboriginal homesteaders left the park in 1910, this action had an impact not only on the Aboriginal community but also on the montane landscape with which they had interacted for so long. In the second instance, during the twentieth century the grassland communities of the UAV montane ecoregion have shrunk while forest communities have increased both in size and in density (Rhemtulla, 1999).

The animating question of the present study is: What was the impact of Aboriginal and Parks land management practices, if any, on the vegetation composition of the UAV? There are four related secondary questions: How did the differing worldviews of the Aboriginal homesteaders and park management affect their respective management practices? How did certain management practices, like prescribed fire, affect the vegetation composition particularly grassland areas? How did Parks Canada land management policies develop during the twentieth century? What new directions for future management of national parks might exist?

I examine the historical records for references to both Aboriginal communities and vegetation composition. I located historical records for the periods 1810 to 1831 and 1858 to 1873. Oral traditions, represented through interviews of the last survivor of the Aboriginal homesteaders and their descendants in the AWN, provide information on the traditional land management practices and the history of the community in the UAV before the exodus. The ecological records including the 1915 and repeat photographs, fire history and dendrochronological studies are used to interpret the history of vegetational community change during the nineteenth and into the twentieth century.

The organizational goal of this study is to reflect the interconnection between the humans and the landscape. The effort to incorporate the story of the Aboriginal homesteaders into the story of the landscape, without reinforcing the supposed dichotomy between the human and natural world, means fusing the human story into the story of the ecology. Chapter 2 examines the management institutions of traditional ecological knowledge, the theoretical basis behind the study of people and their relationships to the land in anthropology, and the advent of ecological restoration research in JNP. Chapter 3 focuses on the worldview, establishment and management of parks, ecological influences on the landscape, fire ecology, the prescribed fire program in JNP and the Aboriginal history of the UAV. Chapter 4 is the data chapter, where the historical vegetation composition of the UAV is detailed, along with the fire history according to Aboriginal and ecological fire records. The analysis of the 1915 and repeat photograph pairs of JNP are included as well as maps of the landscape patterns in the UAV detailed by the historical and interview sources. The chapter ends with a discussion of the influence of worldview on management practices. In chapter 5, the results of the study are discussed. The paradoxical nature of wilderness, the implications of historical landscape changes in the UAV, and prescribed fire issues in national parks, next steps for research, and recommendations for future research in JNP are detailed.

1.2 Methodology and Sources

Informing this study is the widest possible range of materials. The shortage of information on the Aboriginal history, traditional ecological knowledge and landscape history of the UAV requires gathering diffuse information from a wide a variety of sources. Triangulating these materials, created at different times and in different ways, provides the greatest amount of information. Historical documents- letters, journals, survey records, Department of Interior Annual Reports, interviews with Elders, ecological studies, and historical and repeat photographs are incorporated. As the Aboriginal homesteaders in the UAV did not sign on to Treaty, nor was an Indian Reserve established, Department of Indian Affairs records were not directly relevant. No one source of information could provide sufficient information on its own; however, the sources in concert provide a wealth of information.

Historical documents were interpreted for the reports pertaining to the UAV region. Applicable records were located in the Alberta Provincial Archives, the Hudson's Bay Company Archives in Winnipeg, Manitoba, the National Archives of

Canada, the Jasper-Yellowhead Museum and Archives library and the University of Alberta Library. Information in these documents relating to the vegetation composition, Aboriginal peoples, and historical development of the UAV was gathered. The information from the various sources were then collated to illuminate landscape patterns. As much as possible the specific locations of vegetation descriptions in the UAV were then recorded on the maps created for Chapter 4.

These historical documents required careful interpretation, as a number of factors with respect to reliability must be taken into account. As many of the explorers or surveyors were traveling through the region quickly, a number of days in many cases, their accounts may be cursory. Most individuals belonging to the various parties were unfamiliar with the region, and may have located landmarks incorrectly. Moreover, the purposes of the historical documents were distinct from the objectives of the present study. The time of year of the observations was critical for collecting vegetation composition data. For example, winter observations could not provide detailed records of grasslands. Further, the society the explorers and surveyors lived in was quite different from modern Canadian society. Racism and prejudice toward Aboriginal peoples was rampant, and is often clearly reflected in the language used to describe Aboriginal communities and activities. Additionally, in-depth knowledge of Aboriginal history and the composition of Aboriginal communities was poor at best. Every effort was made to garner as much information as possible from these sources.

The 1915 Bridgland survey and 1998-99 repeat photographs were attained through the Bridgland Project, directed by Dr. E. Higgs. These photographs were scanned by another researcher (J. Webb). Relevant photographic stations for this project were selected from those scanned photographs. The 1915 photographs were used to interpret the type of vegetation cover and extent of grassland areas in the UAV five years after the Aboriginal homesteaders were removed. The repeat photographs provided a context for the extent of vegetation change in these grassland areas by the late twentieth century. The repeat photograph collection, the 1915 topographical photographs of M.P. Bridgland, and the 1998/99 repeat project of Jeanine Rhemtulla visually depict Jasper National Park and some of the changes that occurred over an eighty year period. Both of these collections are based on survey stations located in the central region of the park and a number of stations depict the UAV. The photographs depict the landscape of the UAV including mountains, rivers, wetlands, grasslands and forested areas. The appropriate stations to depict the UAV were determined, and the photographs then examined for pictures of the valley only, not the adjoining mountains or glaciers. Photograph pairs were then selected to give the best possible view of the landscape. The landscape was then visually examined for grassland and open forest, and qualitative comparisons were made between the 1915 and 1998-99 photographs.

The Bridgland and repeat photographs were examined in the Adobe Photoshop program. Each photograph was examined closely, using the zoom tool, for features of vegetation cover. Descriptions of the vegetation composition in both low and higher elevations were developed for each photograph pair, and qualitative comparisons made between the vegetation depicted in the 1915 and repeat photographs.

The interviews with Elders used in this study include those collected for previous studies such as the Aseniwuche Winewak Nation traditional land use interviews, Dr. Murphy's interview with Ed Moberly, the last surviving member of the Aboriginal homesteader community who passed away in the early 1980's, and my interview with Mrs. Desjarlais (a pseudonym), which was generated for this study. Mrs. Desjarlais was selected as the most significant individual to interview as she spent her childhood living with her grandfather, John Moberly, one of the Aboriginal homesteaders who was removed from the park in 1910. She grew up with her grandfather in Entrance, just outside JNP boundaries, and was often told stories by her grandfather about the homesteader community and their home in the UAV. The preliminary interview with Mrs. Desjarlais occurred over the telephone, and a time was set to interview her in person shortly thereafter. Since Mrs Desjarlais declined to be recorded during the interview which took place at her home near Grande Cache, extensive notes were taken during the interview and subsequently transcribed. Mrs. Desjarlais declined to review the notes or the narrative based in part on her knowledge. In 1999 and 2001 the Aseniwuche Winewak Nation interviewed all the Elders in the community that could speak to traditional territory and land uses. This information was utilized by the Aseniwuche Winewak Nation to create a map of their traditional territory and a record of traditional land uses. The Aseniwuche Winewak Nation gave me permission to review these interviews and collect those that pertain to the UAV. All of the interviews that mention the region in any fashion were collected. All interviews were analysed for information pertaining to the Aboriginal homesteaders history as well as usage of the UAV. General statements about family history in the UAV, and specific statements about how people used and managed the land were collected.

This information was then organized into categories of vegetation composition, Aboriginal history and historical development of the UAV, as appropriate. As much as possible, the information pertaining to vegetation composition and Aboriginal land use practices was also recorded on the maps.

Ecological studies conducted in JNP were surveyed for relevance to the present study. Studies that pertained to the vegetation of the montane, including paleoecological, dendrochronological and fire history studies were examined. Information about montane vegetation and vegetation history was inferred from these studies, and included in the narrative. The fire history data was incorporated into the maps in chapter 4.

The maps included in this study were created by analysing the historical and interview sources for specific information on the UAV landscape composition. There are three layers which reflect pertinent time periods: layer one refers to the information available for 1810 to the 1830's, layer two covers 1858 to the 1870's, and layer three is a fire history layer based on studies from Tande (1977), Rogeau (1999) and White (2000), as well as outlining areas where the vegetation composition was consistent between 1810 and the 1870's. The historical sources used to create the maps, and the time period spent in the UAV, are Thompson (1810), Franchere (1814), Cox (1816), Simpson (1824), Douglas (1827), the Jasper House journals (1827-1831), Hector (1858), Milton and Cheadle (1862), Walter Moberly (1872), and Rylatt (1872). The pertinent information from the Ed Moberly (1980) interview was incorporated into map layer two. I purchased Softmap software for the JNP area, this software uses the Canadian Topographic (NTS) maps as a base and offers a range of symbols that can be added to the base map. Three map layers were developed in this manner. The Softmap Company is no longer in operation. The map layers were then imported into Adobe Photoshop. In the Photoshop program the highway, railway, campsites, lookout and communication stations were removed from map layers one and two, as none of these features were a part of the landscape during the 1810s to the 1870s. The highway, railway and other modern features were not removed from layer three to provide a comparison for the nature and form of modern human activity in the UAV.

The maps are a tool to illustrate the patterns on the landscape of the UAV. They show relations between grassland areas, grazing and burnt areas, homesteads and fire history patterns. The time periods were chosen to reflect available information. There was insufficient information to devise map layers by decades; however, a time limit had to be placed on the landscape patterns that could be determined with any accuracy. The span of approximately two decades limits the potential changes in plant composition. Forest replacement of grassland takes longer than twenty years. Each source was examined individually for landscape descriptions, and symbols were then assigned to homesteads, trading posts, forested areas, grassland areas, grazing areas and burnt areas. Landscape composition descriptions that were not identifiable to a specific area were not included. The result of such vague descriptions is the paucity of forested areas and small patches of grassland depicted on these maps. The symbols were assigned to more substantive descriptions. For example, a minimum of about an acre of grassland received one symbol on the map. Therefore the larger the area, the more symbols on the map. Only landscape descriptions of the valley itself are depicted, as the alpine and sub-alpine regions were not a part of this study.

Chapter 2. Changing Institutions; Changing Landscapes

2.1 Introduction

What is the nature of wilderness? How do humans fit into the natural world? These questions have been the focus of scholarly work in many disciplines. There are many different aspects to the question of the relationship between humans and the natural world, and the ability of wilderness and humans to coexist. Many scholars (Berkes, 1999; Cronon, 1995; Freeman, 1992; Hayles, 1995; Higgs, 2000; Lewis, 1985; MacLaren, 1999) have clarified key aspects of the relationship between humans and nature, and characterized changes in the understanding of this relationship.

This chapter examines the relationship between humans and their environment. Human societies create institutions, in part, to establish a relationship between the society and the environment they live in. Such institutions are rooted within social worldviews[2]. Institutional change can have a physical impact on the landscape. The worldview of a particular human community shapes the community's perspective toward the landscape, and landscape perspectives can differ markedly from one community to another. The influence of human communities on the landscape, and a means to formally characterize that influence, is an important aspect of landscape history. Changes in the dominant worldview toward nature of the occupying human community may therefore leave a visible mark on the landscape. Such changes are found in the history of national parks and are discussed in this chapter.

The concept of wilderness and the establishment of national parks are intimately connected. Wilderness is a word frequently used in popular literature but without reference to the development of the concept its import cannot be fully appreciated. I begin with a discussion of the socially constructed concept of wilderness, how this complex concept influenced the creation of national parks, and the meaning of wilderness today. The history of parks establishment in Canada follows; including the initial focus on attracting tourism, past management paradigms, the current management agenda, and relations with Aboriginal communities. The establishment of Jasper National Park, from its early development to the challenges of today's ecological integrity and adaptive management, is covered in this chapter.

---

[2] A worldview is the body of beliefs about the world that are shared by the members of a society (Moran, 2000, p. 355).

The theme of the relationship between humans and the landscape is more fully explored through a discussion of ecological anthropology, traditional ecological knowledge, and the impact of worldview on management techniques and goals. The influence of historical ecology on the current management paradigms in national parks and the concept and meaning of ecological restoration concludes the chapter.

Understanding the influence of management institutions and the effect of institutional change on the landscape illuminates the complexity of historical landscape patterns. The institutional change initiated with the establishment of national parks and the removal of Aboriginal communities is part of the landscape history of the region. How can changing an institution impact on the land? Perspectives towards the landscape changed. A place where, at one time, people and the landscape were connected became a wilderness that people would inevitably destroy. This necessitated the subsequent removal of people from the landscape except as tourists or temporary visitors.

2.2 Wilderness History

"All cultural events, beliefs, and institutions are valid relatively, suited to or at least rooted in their times" (Worster, 1977, p. 345).

Concepts of nature are intimately related to wider aspects of social organization, politics and spirituality. The term "wilderness" often evokes strong emotions that are tied to assumptions of the natural world and the human place within; however, wilderness does not exist in the physical world in the same way that a river or a lake does. The physical form of wilderness is defined by human perception(s). "Far from being the one place on earth that stands apart from humanity, [wilderness] is quite profoundly a human creation - indeed, the creation of very particular human cultures at very particular moments in human history" (Cronon, 1995, p. 69). The socially constructed concepts of nature, wilderness and civilization and the changes that accompany these concepts over time influence the perception of the natural world (Merchant, 1995, p. 153). The history of wilderness and its meaning, and evolutions in meaning, have impacted the land, people and national parks.

Definitions of wilderness are not static, but are influenced by history and by interpretations of the interaction between humans and the world(s) in which we live. Cronon (1995, p. 70) describes how the meaning of wilderness has changed: at the beginning of the industrial age wilderness meant wasteland. It was land that had not been improved through human agency and was viewed as separated from civilization. The value of land to humans lay in the purpose it could serve for human needs. This view was inherited from the philosopher John Locke, who established that property must be "improved" to make it valuable to the owner and to society (Devall, 1994, p. 127). The connection between the concept of redemption from sin through the virtue of work was transferred to the land, thus neglected land became improved through human labour (Merchant, 1995, p. 141). Western science and the growth of capitalism were connected to the goals of controlling and transforming nature into a state of order and civility (Ibid, p. 136). By the end of the nineteenth century the meaning of wilderness had transformed. It became viewed as sacred, a place where a human in retreat from the modern world could have a religious experience (Cronon, 1995, p. 74). Consequently, the number of people searching out the spiritual and aesthetic experience of wilderness described by Thoreau, Muir and others began to grow (Buell, 1995, p. 137). Only the well-off could afford to climb mountains in search of this romantic god, the poor were too consumed with the immediacy of survival. Subsequently, wilderness emerged as a recreation destination for elite tourists, and the elite became the consumers of wilderness (Ibid, p. 78).

The establishment of wilderness areas and of national parks are closely tied to the social construction of wilderness itself. The change in meaning of wilderness from a wasteland to a religious destination occurred at the same time that Aboriginal peoples were being disassociated from their traditional land bases and forced onto reservations in the nineteenth century. There were a multitude of reasons behind the desire of governments to confine Aboriginal people to reservations that sometimes comprised a small area of their traditional territories, and other times were in locations far removed from traditional territories. Aboriginal communities were forced into occupying smaller and smaller areas. The acculturation of Aboriginal communities was an important goal for governments and reservations were created to further this ideal. The creation of reservations was also far more cost efficient for the government than mounting military expeditions to wipe out the Aboriginal communities (Berkhofer, 1978, p. 168). Further compounding the issue, many of the national parks in both the United States and Canada were a part of the traditional territory of one or more Aboriginal communities. However, wilderness could only be "virgin" if the land was uninhabited by humans, so that tourists could enjoy their recreation in a pristine place detached from human history (Cronon, 1995, p. 79). The North American wilderness, however, was a peopled wilderness (Noss and Cooperrider, 1994, p. 15). This idea of a virgin landscape was an illusion. As Cronon states: " This, then, is the central paradox: wilderness embodies a dualistic vision in which the human is entirely outside the natural. If we allow ourselves to believe that nature, to be true, must also be wild, then our very presence in nature represents its fall" (Cronon, 1995, p. 80). Graber (1995, p. 123) describes the wilderness myth as the theoretical basis for the management of national parks. Parks now function to provide an alternate to technological society - landscape that is carefully managed to conceal the passage of humans (Ibid, p. 124). A statement from one of the first annual reports of Rocky Mountains Park, which became Banff National Park, clearly illustrates the paradox of the wilderness myth: "This road is located over a most beautiful tract of country, and cannot fail to afford pleasure and interest even to those who have no other objects[sic] than a ride or drive through a country presenting objects for admiration on all sides..." (Department of the Interior, Annual Report 1888).

The history of wilderness is as much a history of the humans who created the concept as it is a history of a particular landscape. Deloria, Jr. locates the creation of the myth of wilderness in the unfamiliarity of Europeans to the North American landscape:

> The westward movement of white society, in which each generation leap-frogged forward perhaps as much as a thousand miles, prohibited the creation of the necessary psychic roots that would have given people confidence in confronting new landscapes (2001, p. 27).

For the Aboriginal peoples of North America the wilderness was home: familiar places where people belonged, places where people had roots and identity.

It is essential to consider the connection between ideology and wilderness in the history of national parks. In the case of JNP, human history is over 10,000 years old and ignoring the interaction between humans and the land means disregarding the millennia of human history since the last ice age (Kay et al., 1994, p. 3-15). The ability to inhabit a place is an important means of connection to the place and it is a point of concern for parks management: "It is rather that we seem unlikely to make such progress in solving these problems if we hold up to ourselves as the mirror of nature a wilderness we ourselves cannot inhabit" (Cronon, 1995, p. 83).

Perspective influences the creation and the acceptability of various land usages and practices. If wilderness is considered pristine then people can not manage the land in traditional ways (e.g. burning or hunting), while at the same time, it is acceptable for the affluent to golf, camp and drive. If wilderness is perceived as home then there is a place there for human occupation and use. Botkin describes the link between perspective and management in this way: "The potential for us to make progress with environmental issues is limited by the basic assumptions we make about nature, the unspoken, often unrecognized perspective from which we view the environment" (Botkin, 1990, p. 5).

The management problems that develop out of the concept of a natural separation of humans from wilderness are serious issues for Canadian national parks and are described well by Cronon. "The wilderness dualism tends to cast any use as *ab*-use, and thereby denies us a middle ground in which responsible use and non-use might attain some kind of balanced, sustainable relationship" (Cronon, 1995, p. 85). Botkin explains that in order to manage wisely, the nature of nature must be understood - and the nature of nature is change. In attempting to understand the way nature works and applying that understanding in management practice, people can live within rather than destroy nature, either through human actions or perspective (Botkin, 1990,p. 11). Hayles characterizes the link between perspective and management as a framework that creates boundaries: "Although framework does not uniquely determine the theories, it creates a matrix of thought that defines ranges of possibility" (Hayles, 1995, p. 58). Perspective influences both thought and action. For example, if pristine wilderness exists then human society has never belonged in that landscape.

Cronon's wilderness paradox is well represented in JNP. The "pristine" quality of the landscape had to be protected, through the removal of the Aboriginal community, when JNP was created. The millennia of prior human use, including the nineteenth century history of the fur trade in the Athabasca River Valley, was discounted. MacLaren states: "Jasper House II thus remains the sort of historic site that distinguishes Jasper from Canada's other mountain parks; only through the Athabasca River valley did the routes of the transcontinental fur trade regularly pass...."(1999, p. 16). The long history of human use expanded in new ways during the twentieth century. The completion of the Grand Trunk Pacific and Canadian Northern railway lines through JNP by 1915 eased access to this "pristine wilderness" in a way previously unknown to the trappers, hunters, gatherers, traders and homesteaders who lived in the area. The railway lines provided access to the affluent tourists who consequently provided the economic incentive to the government to establish and maintain national parks. "The fur trade had found its successor in tourism. However paradoxically it strikes the mind today that land could be protected at the same time as it could be exploited, that tension informs the original parks act..." (Ibid, p. 19).

If wilderness is a social concept, and not a physical reality, then why preserve natural places? Why have national parks? Are natural places actually preserved/managed by denying landscape history and the history of humans and human use in the landscape? Clearly, there are some uses that have negative effects on not only the land but on the lands' future, like coal mines for example, but there are human uses which can help to maintain biodiversity, sustainability and other ecological values. Eliminating human land use, except for tourism (which is, paradoxically, not considered a land use) is dangerous. Management goals of ecological integrity, biodiversity, and sustainability do not have to preclude all human use. They do, however, require an understanding of the undeniable connection between humans and nature, and a realistic assessment of the historic and current impact of human choices on the landscape. The interaction between humans and the environment is a dynamic relationship that forms landscapes in culturalized ecosystems.

2.3 Parks Canada: "The Playground of the World"

> The national parks of Canada are dedicated to the people of Canada. They are intended for their benefit, education and enjoyment, and are to be maintained and used in a way that leaves them unimpaired for future generations (Parks Canada, 1999, p. 20).

The history of Canada's national parks is reflected in three themes which emerge in examining park establishment: tourism support, management paradigms, and treatment of Aboriginal people. The public views Canadian National Parks today as the last vestiges of "pristine wilderness" protected for all Canadians to enjoy in perpetuity. The history of the establishment of the parks, however, reveals a different goal. When the national parks were first established, one primary objective was the attraction of visitors to the parks. These factors impacted the establishment, as well as the subsequent development and management of national parks in Canada.

2.3.1 *Tourism Support*

The first Canadian national park, Rocky Mountains Park[3], was established in 1885. The early reports of the Superintendent of Rocky Mountains Park depict a focus on attracting visitors through availability of accommodation and access to the townsite and outlying attractions. "To hold out and create greater inducements towards the development of this annual influx of visitors should be a primary object" (Department of the Interior, A.R. 1894). In the 1880's and 1890's this largely meant constructing both roads and accommodation, particularly around the hot springs, as well as creating plant nurseries, museums and sanitariums (Department of the Interior A.R., 1889, 1894). Visitor needs and expectations were paramount at this time and the aesthetics of parks were an important factor in attracting tourism. For example, evergreens were planted along the road to the village in order to make the village more visually appealing (Department of the Interior A.R. 1889). The concern about wild fires during the establishment period was not only about the loss of attractive trees but also about the affect of smoke on visitor expectations.

> The fires that took place early in the season, although local, did not have the effect of obscuring the mountains in the park, but those that occurred later on in August and September, threw a dense cloud over the whole mountain ranges ... It was unfortunate that the visit of the Canadian Medical Association took place at this time, as it was very desirable that such a highly intelligent and influential body of men should see this health resort in its usual condition, and not in the exceptional one in which it was unfortunately their fate to witness it (Department of the Interior A.R., 1889).

Large numbers of visitors helped to maintain the parks and the parks were a drawing factor for the Canadian foreign tourist market. Visitor numbers at Banff National Park steadily increased; from a few thousand in 1887 to 73,725 people by 1912 (Department of the Interior A.R. 1913). For the fledgling country, attracting foreign tourists was essential to the economy. In 1919, the Commissioner of Dominion Parks stated:

> Throughout the year the work in connection with the parks service has been planned and carried out primarily with a view to bringing into Canada a revenue of millions of dollars from foreign tourist traffic. Special attention has been given to this subject because it is recognized that on account of the war debt it is vital that Canada should concentrate on the development of revenue producing activities (Department of the Interior, A. R., 1920).

---

[3] Rocky Mountains Park subsequently became Banff National Park.

The National Parks were initially hailed as recreation areas for wealthy Canadian and foreign tourists. "Canada's national parks contain the most attractive portions of the mountains and therefore are the potential 'playground of the world'" (Department of the Interior, A.R. 1920). The parks were viewed as areas that would contribute valuable revenue into federal coffers, and obtaining reliable sources of revenue was of utmost importance to the federal government.

> Now it is interesting to compare the value on an acreage basis of our exports of wheat with what we may call our export in scenery. The acreage of the Rocky Mountains Park in 1915 ... was 1,152,000 acres, and the value of the foreign tourist traffic it attracted was roughly speaking $16,000,000. This works out to a per acreage value of $13.88... the value of our wheat exported that year was $4.91 per acre (Department of the Interior, A.R. 1920).

At the beginning of the establishment period the development of national parks focused on the desires and material comforts of the potential tourists.

> The policy upon which the Branch is carrying on its development work is based on the belief that the majority of people, Canadians or others, who visit the parks are used to some degree of comfort and that no matter how fond they are of nature they will not take a park tour unless assured of some degree of comfort, convenience and safety (Department of the Interior, A.R., 1912).

Initially, park development did not focus on ecosystem health. The concept of ecological integrity, which currently guides the management of National Parks, did not appear for many decades. In the early twentieth century it was assumed that the "protection" of these regions would increase the value of the land, not only in terms of the lands' potential to generate revenue, but also in and of itself.

> On the other hand, once national scenery is set aside and protected and opened up for public enjoyment, as it is in our national parks, it tends to increase in value, and the more it is used the more valuable it becomes, because tourists who are delighted with their visit not only decide to come again, but they go home and tell their friends and acquaintances to come too, and the tendency each year, as the parks become better known, is for the traffic to keep on growing (Department of the Interior, A.R., 1920).

The national parks were intended for the recreation of the elite, not for the masses or the marginalized peoples of Canada. The 1894 Annual Report expressed concern over the existence of "tramps" in the Rocky Mountains Park, and their effect on the preservation of the landscape.

> This fire was no doubt occasioned by tramps. There is no other way of accounting for it. People of this class are frequent visitors to the park in summer, and, although every effort is made to capture them, they have so

> many means of hiding in the woods and rocks that it is difficult to follow them up... The law will have to be very stringently enforced against this class of visitors. They might be the means of destroying the park under circumstances favourable to that end (Department of the Interior A.R. 1894).

Bella (1987) describes one of the goals of park establishment as a means to centralize control over the mountain landscapes in the hands of the railways, controlled by powerful and wealthy men. This control was used to limit access to the mountains and reduce competition in the parks. Businesses aimed at the working class were not considered appropriately aesthetic. Instead, access was limited to upper and middle-income tourists who were willing to pay substantial sums for luxury trips in the mountains (p. 24).

Tourism remains a central influence in the management of national parks. The number of visitors to the national parks has increased from just over 75,000 to Banff National Park in 1913 to 1,947,286 visitors to JNP in 2001-2002 (pers.comm., M. Queenton, March 10, 2003). Now, management of the tourists and their impact on the landscape is of paramount concern for national parks. Limits have been placed on the number of people who can reside in the parks, and efforts have been made to limit the negative effect of heavy tourist traffic. The large number of people that come to the parks to ski, hike, camp, or the multitude of other activities and entertainments available impact management strategies for wildlife and ecosystem preservation or restoration.

2.3.2 *Management Paradigms*

The management paradigms that operate in national parks have changed during the twentieth century; from interventionist through natural regulation to the current system of ecosystem management (Higgs et al, 1999, p. 17). The intervention paradigm which prevailed in Parks Canada before the 1970's involved direct manipulation of animal population, fire surveillance networks, fire suppression, logging for building materials, and facility development (Ibid). The natural regulation paradigm prevailed beginning in the 1960s and tapered off in the1990s. This paradigm involved attempts to limit human impact and reinforce the concept of national parks as sanctuaries from the outside world (Ibid). The new management focus is ecological integrity. Each of these management changes have impacted the national park system.

The early management of national parks was a combination of protection for herbivores and non-predatory birds, and an extermination of all predators, including cougars, wolves, foxes, coyotes, eagles and owls (Dept. of Interior A.R. 1887)[4]. Animal species selection was acceptable according to the management policies of the time. "Vultures, pelicans, buzzards, ravens and crows might remain for scavengers" (Dept. of Interior A.R. 1887). Land management policies like fire suppression were intended for aesthetic considerations as well as to preserve the wilderness. This combination of extermination policies for predators with suppression of disturbances, like fire, impacted the landscape in ways unforeseen at the time. At the same time as the prohibitory regulations were impacting predators and fire regimes, parks management was planting wild rice and restocking lakes (Department of the Interior A.R. 1887). They were also making infrastructural improvements such as constructing roads, bridges, bathhouses, stores, post offices, blacksmith shops, schools, villages, saloons and churches, and reforming the hot springs for easy tourist access (Department of the Interior A.R. 1888).

Drawing tourists into the parks was essential for the early management of national parks, and creating awareness of the pleasures of mountain landscapes was an integral feature of attracting tourists. Glossy, illustrated brochures that upper and middle class tourists would appreciate were designed and amenities were created for this population. Suitable architecture for the townsites was planned and built, and mosquito control programs were initiated (Department of the Interior, A.R. 1924).

In addition to attracting tourism and preserving the landscape, the 1920's to the 1970's focused on national park and national historic site development. Across Canada national parks and national historic sites were established. The concerns of national parks and historic sites were expanded through this period to include the promotion of specialized areas like historic architecture (Taylor, 1990, p. 98).

In the last two decades, there has been a significant shift in the attitudes and policies which guide National Parks management. Predators are not systematically exterminated, there are no zoos in the parks, and bears are no longer encouraged to eat out of garbage cans. Parks Canada has recently adopted a system of "ecosystem-based management" for national parks. It is a multi-disciplinary approach that seeks to incorporate biological, physical and social information to produce positive and productive long-term relationships between park users and the landscape (Parks Canada 2000a, p. 6). The management goal is ecological integrity.

---

[4] National parks had extermination programs for predatory animals until the 1960's (Kay et al, 1994, p. 1-8).

The goal of ecological integrity is to improve the long-term management strategies for national parks in Canada. The *National Parks Act* defines ecological integrity in a national park as: "A condition that is determined to be characteristic of its natural region and likely to persist, including abiotic components and the composition and abundance of native species and biological communities, rates of change and supporting processes." (*National Parks Act, 2000*) The ecological integrity concept expands some of the management options available. For example, prescribed fire programs may be introduced to re-incorporate disturbance regimes in the parks. The JNP management plan defines ecological integrity as: "A condition where the structure and function of an ecosystem are unimpaired by stresses induced by human activity and are likely to persist" (Parks Canada, 2000a, p. 9). Ecological integrity is measured in terms of ecosystem health, biological diversity, maintenance of healthy and adaptable plant and animal communities, and a healthy integration of people into the environment (Ibid, p. 10). The challenges of managing for ecological integrity have required Parks Canada to re-examine the role and impact of people in the environment.

The adaptive management policies required for ecological integrity are based on a process of monitoring, evaluating and reporting on management outcomes. The unanticipated outcomes that occasionally result from implementing these new management strategies are viewed as an opportunity to learn, and participants recognize that learning is a valuable and integral part of the management process. The Panel for Ecological Integrity was established to address the implementation of the ecological integrity management strategy in national parks. As described in the Ecological Integrity Report, research is viewed as an integral part of adaptive management: "The fastest progress towards policy goals is realized when management actions are planned and undertaken as controlled and replicated experiments that afford greater certainty of management actions" (Parks Canada, 2000b, p. 3-2).

Resulting policy changes include the restoration of fire events, Aboriginal traditional uses, intensive management and research partnerships with industry and academic institutions. Park managers view fire restoration programs as ideal for the institution of adaptive management. Other significant aspects of adaptive management include intense management of hyperabundant species such as elk in Jasper and Banff National Parks. A variety of management options such as the removal and/or culling of herbivores are some of the very new, and controversial, aspects of adaptive management (Ibid, p. 5-12). Moreover, new relationships with Aboriginal peoples have been discussed in recent years with active co-management partnerships created and maintained in some parks. The recognition that parks should work with Aboriginal people is particularly significant. Re-incorporating traditional land uses into parks management are being considered: "Re-integrating Aboriginal traditional uses to national parks may mean a larger role for Aboriginal use of fire, harvesting and other activities which essentially constitute 'active management'" (Ibid, p. 5-2).

The management policies necessitated by the new mandate for ecological integrity have created some debate in the parks system. The recognition that, in many national parks, restoration of ecosystems is necessary for ecological integrity, requires policies that take into account historical landscapes, human use and habitat degradation. "Those of us who have been raised with the motherhood statements of Parks Canada Policy are struggling with a move away from the sanctity and security of our 'wild' and 'natural' parks" (Mercer, p. 1). The need to improve ecological integrity while maintaining high visitor levels and meeting visitor's expectations is an ongoing challenge (Parks Canada, 2001, p. 1). Changing management policies also necessitates different communication styles with the public, as the public may not be aware of the problems that arise with degraded ecosystems within park boundaries and in connecting areas. "We have to tell it like it is and let Canadians know that parks are merely one component of larger landscapes and by themselves cannot protect many of the attributes they were intended to" (Mercer, p. 1).

2.3.2.1 *Fire Policy*

Attitudes towards fire have evolved in parks management. From 1886 to the 1970s the prevalent attitude towards fire was that of persistent, active suppression. Department of the Interior annual reports often described the dangers of fire and the need to prevent them (Department of the Interior A.R. 1889, 1894). Fires were considered to be a danger to the land and the economy. This attitude continues today, particularly in the popular media, while in sharp contrast, the Ecological Integrity Panel Report describes fire suppression as a serious threat to ecological integrity (Parks Canada, 2000b, p. 5-4). Fire restoration programs are characterized as ideal for implementing adaptive management policies. This description reflects a major shift in the philosophy of parks management towards fire.

From park establishment through the 1980's, the period of active fire suppression, there was a sharp reduction in the frequency of fire in southern Canadian parks. Notably, fire suppression appears to have been successful due not to fire-fighting methods, but as a result of the prevention of human-caused fire (CPS, 1989, p. 7). As previously discussed, the establishment period for national parks, with its focus on development and exploitation, including mining and logging, caused significant changes to vegetation in parks across Canada. For example, in La Mauricie National Park, Quebec, after 100 years of logging the white pine forests have been replaced by hardwoods (Ibid). The fire suppression policies implemented in national parks also created tremendous changes in vegetation composition.

Parks' fire policies were revisited by parks management in the late 1970's. Some innovative fire management research in the U.S. created interest in Canada for implementing new fire management strategies. This fire management research included a combination of prescribed management fire, 'prescribed natural fire' (lightning-caused fires allowed to burn under certain constraints), and the suppression of all other ignitions, natural or human in origin, that were not authorized by management programs (Graber, 1995, p. 124). Faced with the uncertainties of a prescribed fire program many park managers were reluctant to implement fire management (Lopoukhine and White, p. 60). Literature reviews, strategy papers and organizing workshops resulted in a 1986 fire management directive (CPS, 1989, p. 9). This directive recognized fire as an important factor in ecosystems, but prioritized fire control to protect park facilities and visitors. Prescribed fire, from both random and planned ignitions, was recognized as an important management strategy and experimental planned prescribed fires were initiated in Jasper, Elk Island and Prince Albert national parks (Ibid, p. 11). By 1989, the Western parks prescribed a total of 2000 hectares per year; however, major weaknesses in fire management infrastructure prevailed and had a negative impact on the program. The lack of sufficiently skilled personnel, up to date fire management plans, fuel reduction programs and other fire information were significant problems (Ibid, p.24). The 1989 CPS report reviewed the history of fire suppression and made detailed recommendations to the parks service on the development and maintenance of fire management programs adaptable to local conditions. The goal of this report was the implementation of prescribed fire in 12 parks by 1994 (Ibid, p. 61). This 1989 report remains the "bible" for parks service fire programs (pers. comm. Dave Smith, July 2002).

The result of the fire suppression policy has been a reduction in forage due in large part to a lack of fire and the subsequent forest encroachment on grasslands (Parks Canada, 2001, p. 22). The landscape variation caused by fire contributes to healthy, diverse ecosystems. Managing for ecological integrity will, at times, mean restoration. The parks management goal of restoring at least 50% of the historic fire cycle through prescribed fire and "let it burn" policies will help maintain ecosystem equilibrium (Ibid, p. 29). Under current conditions, 100% restoration of the historic fire cycles is not possible. The conflicts between protecting townsites, recreation facilities, campsites, and Forest Management Areas located outside park boundaries preclude implementing complete historic fire cycles.

There are additional challenges in implementing prescribed fire programs in parks that have endured many decades of fire suppression policies. A great deal of fuel has accumulated in the last 90 years, and it is no longer simply a matter of lighting a few fires in early spring or late fall. Repetitive burns or mechanical removal of fuels may be required to reduce fuel loads to acceptable levels (Lopoukhine and White, p. 61). Vegetation plans are necessary for the proper integration of fire management within parks policy (Ibid, p. 67). Re-integrating fire into the ecosystems of parks requires careful thought, analysis and planning in order to meet ecological integrity goals.

2.3.3 *Parks and Aboriginal People*

The needs of local communities of Aboriginal peoples were not a part of the initial vision for Canadian national parks. They were viewed as an impediment to progress and development, an obstacle to be removed. "Exceptions of no kind whatever should be made in favor of Indians. Those who now invade that territory are stragglers and deserters from their own reserves, where they are well cared for in food and clothing at the public expense" (Department of the Interior A.R. 1897). Hysteria over perceived exploitation by Aboriginal hunters was clearly expressed by the Superintendent of Rocky Mountains Park in 1906:

> Among the offenders against the game laws, the Indians are by far the worst. They invade the National Park at all seasons of the year, and slaughter any animal they run across without regard to age or sex.... The Indian has been led to believe that he is entitled to slaughter game at any time of the year and

> wherever he may find it. I would recommend that your department should without delay instruct all Indian agents in the west to notify the Indians in their charge that they are not permitted to shoot any game of any kind at any time in the Rocky Mountains Park, and that any offender against the law in this respect would, if convicted, be subjected to the maximum penalty allowed by law (Department of the Interior A. R., 1907).

The case of Lewis Swift's land grant in JNP is illustrative of the attitude toward Aboriginal people in the early days of national parks. Swift was an American settler who came to the UAV in the late 1890's and married Suzette Chalifoux, from Lac Ste. Anne, in 1897. They had six children. By 1899 Swift had sixteen acres of land under cultivation. Swift kept horses, cows, pigs and chickens and he diverted a creek for irrigation purposes, and he intended on developing the land as resort housing which would be known as Swiftholm. Swift sold his property in 1935 to Arnold Wilby (Campbell et al., 2000). Wilby constructed a country estate and dude ranch on the property and the land was sold back to the park in 1962 (Higgs, 2002). Although Swift had married an Aboriginal woman, the couple did not live on the land, nor relate to the landscape in a similar way to the Aboriginal homesteaders. Swift ran his operation as a standard European farm, complete with irrigation, and had grandiose development plans for the future, and as such, he was not regarded by the park in the way the Aboriginal homesteaders were. In 1911, the acting Superintendent of JNP was charged with the task of: "Preventing squatters settling in the park and negotiating for the removal of those already there" (Department of the Interior, A.R. 1912). One year after the homesteaders were removed from the park, Swift received his land grant for 158 acres (MacLaren, 1999, p. 21). It is likely that Swift's identity as a white man played a significant role in the decision of the park not to remove him, or Arnold Wilby, like the Aboriginal homesteaders.

Lewis Swift is not a focus of the present study, he arrived in the UAV a few years before park establishment and related to the land as a European farmer. For the European farmer land management focused on planting large quantities of particular European plants and maintaining these plantings with irrigation and fertilizers. European land management was not intended to coax the native vegetation to be desirably productive through management practices. The pertinent question was how much land could be plowed and how much irrigation was required to produce the European foodstuffs imported to the new world.

Shortly after the local Aboriginal communities were removed from their traditional territories within national parks, romantic notions of "Indian-ness" were used to draw tourists into the parks. The quaintness and aesthetic appeal of Aboriginal cultures for tourists was expressed in the selling of trinkets and the commercialization of events like "Indian Days" in Banff.

> This annual festival dates back for many years and is eagerly looked forward to - particularly by the Stony Indians who have their reserve at Morley just east of the park boundaries. It offers visitors one of the most interesting events of the season at Banff. The Indians appear in all the glory of their ancestral finery of beads, buckskin, porcupine quills, ermine and eagle feathers. The parade in full dress costume is usually over a mile long with horses two or three abreast... Over 2,200 visitors were in attendance (Department of the Interior, A.R. 1929).

"Indian Days" were popular events in many national parks throughout North America. Yosemite National Park in the U.S. also had "Indian Field Days", where Aboriginal people were expected to conform to popularly held views of Indian culture. "To encourage native participation in these events, park officials paid each man registered $1; every 'squaw' appearing in 'full Indian costume of buckskin dress, moccasin, and head decoration', garments wholly foreign to Sierra Miwok culture, received $2.50" (Spence, 1999, p. 117). In this way, the Aboriginal people who were removed from their homeland upon park creation were used to help market the park to the visitors.

In recent years there has been a shift toward a more inclusive agenda for Parks Canada and Aboriginal peoples. Parks Canada now officially recognizes that Aboriginal peoples were not included in the vision that initially established National Parks.

> Aboriginal peoples have not had a strong voice, historically, where national parks and national historic sites are concerned. As a result opportunities connected to operations have been elusive for them. However, because parks, sites and canals have been important to the Aboriginal Peoples, Parks Canada has been working closely with them and making up for lost time with some significant results. Still, challenges remain (Parks Canada, 1999, p. 3).

In the late 1990's Parks Canada created an Aboriginal Secretariat which will provide Parks Canada "with a focal point on Aboriginal issues and encourage a more proactive approach" (Parks Canada,1999, p. 6).

In the north, Parks Canada has incorporated the mandate to focus on Aboriginal co-management extensively, and in a variety of ways. Many of the northern

National Parks have integrated co-management plans with the local First Nations. These management plans vary greatly, and their differences are designed to suit the diverse circumstances of northern First Nations. These management plans have been negotiated with the First Nations and the territorial and Federal governments. Many of these agreements have been negotiated as part of the final agreements of land claims. For example, Vuntut National Park is co-managed with the Gw'itchin First Nation as part of a broader management plan. In the final agreement to establish Vuntut National Park, the park area was incorporated into the management of the Gw'itchin traditional territory (pers. comm. Bob Gamble, July 15, 2002). An agreement between the government and the Inuvialuit to establish Tuktut Nogait National Park in the Northwest Territories is based on cooperation in planning, operating and managing the park (Parks Canada, 2002b, p. 6). A similar agreement with the Inuvialuit for a national park on Banks Island includes provisions for co-management and protection of the Inuvialuit's right to harvest resources in the park area (Parks Canada, 2002a, p. 8). The variety of management arrangements with First Nations reflects the preferences and needs of the local people.

Recent changes in attitude toward Aboriginal peoples are reflected in JNP as well, though co-management is not currently a part of the plan for JNP, as it is for the far north. The prescribed fire program hires a trainee through the Metis Association of Alberta every two years (pers. comm. Dave Smith, July 18, 2002), and some of the Grande Cache Elders have made trips to JNP and toured the Jasper family homesteads (PB interview with MD). As well a ten year gravesite maintenance agreement with one of the grandchildren of the Jasper families was recently made to stabilize the Suzanne Cardinal gravesite (pers. comm. Rod Wallace, July 18, 2002). These efforts at inclusion are welcomed by the Aboriginal communities (pers. comm. Rachelle MacDonald, July 2, 2002). These arrangements are a testament to the recent positive change in relationships between the national parks and local Aboriginal communities.

2.3.3.1 *International relations between Aboriginal Communities and National Parks*

The National Parks policies that guided the forced removal of the Aboriginal homesteaders out of JNP were common to other national parks in North America and internationally. In the U.S. the Aboriginal peoples were forced out of Yellowstone, Yosemite, Mesa Verde, Glacier and many other national parks in the late nineteenth and early twentieth centuries (Keller and Turek, 1998, p. 19). Land that had once been home to and managed by Aboriginal peoples in a variety of different ways ceased to be homelands. They became "protected areas" designed to draw tourism and provide an economic basis for the region. Similar forced displacements happened in Australia, Africa, and Asia, with similar problems resulting.

Wyoming's Yellowstone National Park was created in 1872, thirteen years before Banff National Park, and similar to the Canadian parks that followed it was a symbol of the splendor of the American wilderness. Like JNP, Yellowstone was home to a number of Aboriginal groups: including the Crow, the Kiowa, the Sheepeaters and the Wind River Shoshone (Nabokov and Loendorf, 1999, p. 62). Also like Jasper, only one group, the Sheepeaters, are considered to have been resident in the highlands of Yellowstone year round (Ibid, p. 247). All of these Aboriginal groups were forced out of the park by 1879 and settled on reservations. Other significant similarities between JNP and Yellowstone can be found in the prior history of fire suppression, and the debate over the effect of Aboriginal fires on Yellowstone's landscape (Ibid). Unlike Jasper, Yellowstone experienced an immense conflagration in 1988. The last enormous fire event in JNP remains the 1889 fires. Recommendations have been made to Yellowstone to more accurately reflect the importance of the land to Aboriginal communities and Aboriginal history in the park, to teach the public about the debates the park faces, to improve communication with Aboriginal peoples, and to re-examine the prohibitions against Native American hunting and foraging in Yellowstone (Ibid, p. 346, 350-1).

There are now co-management arrangements in some U.S. parks. Mesa Verde National Park has arrangements with local Aboriginal communities over repatriating human remains and burial objects unearthed in the park. Before such remains can be touched the local communities have to be consulted to determine appropriate actions (Wall et al., p. 33). In Badlands National Park there is a joint game management plan that allows for traditional Oglala Sioux game management in the park. Hunting permits were issued to tribal members in 1993, and in 1994 funds were provided to hire an ecological anthropologist to identify and incorporate traditional game and habitat management in the park (Ibid p. 34).

The rights of Indigenous peoples and the perceived contradiction between humans living off the land and national park land management are issues that face many countries. There is great variety in the manner that governments deal with these issues, some are more successful than others. There are a range of agreements between governments and Aboriginal communities, from co-management partnerships, joint and cooperative management and consultative arrangements (Ibid p. 9).

Some Australian parks exemplify the potential for co-management between governmental agencies and Aboriginal communities. In Kakadu National Park management decisions are made by a board where Aborigines have a majority vote. This Board prepares the five-year management plans, monitors implementation, and offers advice on future park development (Ibid p. 22). Some conflicts arise over the incorporation of traditional land management practices and western scientific views, for example controlled fire management, with the scientific views prevailing in cases of disagreement (Ibid, p. 23). There is still room for development in such cases, nevertheless majority representation of Aboriginal people on the Kakadu management board is significant progress towards true co-management. The recognition that traditional knowledge can benefit parks management is a significant step towards cooperative management. "Even an extensive field trip of many months by a scientist would be considered a brief foray on the land by any adult Aboriginal person living in the area today (Baker et al, 1992, p. 66)". Other parks that have co- or joint-management arrangements with Aboriginal communities are Uluru National Park, Cobourg Peninsula Wildlife Sanctuary and National Park and Wet Tropics World Heritage Area. A significant difference between these Australian parks and Canadian parks are the Australian parks late-twentieth century establishment. Uluru was established in 1977, Kakadu in 1979 and Cobourg Peninsula in 1981 (Wall et al., p. 19).

2.4 Jasper National Park

One of the well-known mountain parks, Jasper National Park was established in 1907. The creation of coal mines, luxury resorts, golf courses, ski hills, railways, roads (including a national highway), pipelines, powerlines, campsites, and a townsite followed park establishment and the removal of the Aboriginal people from the park. Elk were imported to JNP from the United States to provide the game animal aesthetic appreciated by tourists (Department of the Interior, A.R. 1924).

The existence of coal mines and luxury resorts in the wilderness was not perceived as incongruous in the early days of JNP. The Jasper Collieries, for example, was producing 350 tons of coal per day in 1911 (Department of the Interior, A.R.1912).

The coal transported from JNP in 1912 amounted to 45,000 tons, with the 150 men employed living in thirty houses built by the company on its townsite (Department of the Interior, A.R. 1913). Coal mines operated in the park until the 1920's (Bella, 1987, p. 164). In 1923, Jasper Park Lodge was open for visitors complete with electric light and hot and cold running water, and a golf course was under construction (Department of the Interior, A.R. 1924). Tourist access to JNP was encouraged through railway travel until the development of highways through the park in 1931 (Lothian, 1987, p.52).

Jasper National Park has recently designed an integrated approach to meet the broad goals of ecological integrity. People are now considered in this approach, one that will improve ecological conditions and the quality of experience for park visitors (Parks Canada, 2001, p. 2). The working principle that has been adopted is that of adaptive management. This means that proposed changes will be in place for a test period of several years and the results will be monitored closely before the change is either rejected or accepted as an improved management practice. Adaptive management entails changing the management practices if the results are not as predicted (Ibid, p. 7). The initial approach is focused on four elements of ecological integrity: habitat connectivity, wildlife-human conflict, ecosite/habitat diversity, and aquatic ecosystem health (Ibid, p. 3). A responsive and responsible approach which takes into account these four factors will allow for early implementation of ecological restoration (Ibid, p. 2).

Habitat connectivity is being restored through the limiting or closing of access and secondary roads and managing or restricting human use of trails. Conflicts between humans and non-humans are curbed through diverse and connected habitats. The impact of human presence in the lower elevations of the park on vulnerable wildlife species, like wary predators, will be minimized. These areas include the corridors between the Athabasca, Miette and Maligne River valleys. Habitat connectivity will be improved by limiting the impact of visitors and residents to designated trails (Ibid, p. 15). Wildlife-human conflict will also be lessened with elk and bear management, speed reduction on transportation corridors, and restrictions on grain spillage and road salt (Ibid, p. 24-25). It is necessary to promote measures for appropriate grazing and browsing by native herbivores and horses and to maintain vegetation structure and function (Ibid, p. 5). "Improved predator security in the Three Valley Confluence and restoration of fire to the area are essential elements of an ecologically-based elk management strategy to influence elk distribution and behavior" (Ibid, p. 22). The lack of fire in the UAV and subsequent forest encroachment into grassland has reduced both forage supply and plant biodiversity. This has had a negative impact on some animal species, including herbivores and predators. JNP will restore fire cycles to within 50% of the historic fire cycle (Ibid, p. 29) as part of the new management goals. The introduction of non-native plants in campgrounds and other areas will be reduced by 50% over several years (Ibid, p. 31). The new management strategies are a significant departure from historical policies.

Parks management is influenced by economics, and management policies and financial realities may not coincide. Management polices may be limited by fiscal restraints. Jasper National Park is apportioned a budget, and must provide for all of the needs of management including tourism support, road maintenance, town site and lodging maintenance, administration, and warden service, along with prescribed fire and fire suppression. With limited personnel, meeting all the management needs is routinely challenging. The parks are also a part of wider Canadian society and feel the effects of global events, such as wars or terrorist attacks. Anticipated or promised budgetary increases do not always materialize (pers. comm. D. Smith, July 18, 2002). In order to meet the ecological restoration requirements detailed by the Panel for Ecological Integrity, budgetary increases will be necessary in many parks, including JNP. Parks officials have expressed concern that ecological integrity goals will not be met if greater funds are not forthcoming (Ibid, July 18, 2002).

The principles of historical ecology and ecological restoration guided the1996-1999 Culture, Ecology and Restoration (CER) project, based in Jasper National Park. The CER project explored the historical nature of the landscape in the UAV, and the potential of incorporating restoration into the management framework of a national park (Higgs et al.,1999, p. 1). The contributions of this project in understanding the complexity of human history in this "wilderness", and the possibilities for restoration in Jasper, are detailed in the next section.

2.4.1 *Culture, Ecology and Restoration in Jasper National Park*

The Culture, Ecology and Restoration in JNP research project, completed in 1999, examined past human activities and historical landscapes in Jasper. There were two main questions for the CER project: "What are the extent, character and ecological influence of past human activity in the montane valleys of JNP, and how can such historical knowledge of landscape change influence ecological restoration and management" (Higgs et al., 1999, p. 14). Interdisciplinary knowledge and associated projects were an integral part of the CER project (Ibid, p. 15). The project was premised on interdisciplinary research, as few management problems originate and can be resolved within one academic discipline, and the management challenges in Jasper were viewed as ideal for interdisciplinary research (Ibid, p. 42). Moreover, ecological research has a long history in Jasper, but this research has seldom included the social sciences. The CER project worked to remedy this long-standing omission.

There were two principle aims of the project: examine ecological restoration as a management paradigm for Jasper National Park, and better understand the history of the montane ecoregion (Ibid, p. 37). There were a number of component sub-projects: the Athabasca River Valley during the fur trade, vegetation change in the montane, human activity mapping, oral history, restoration pilot project, multimedia project, natural disturbance mapping, archaeological and paleoecological research (Ibid, p. 55-93). Two of these sub-projects are of particular relevance for this research study: the history of the Athabasca River Valley during the fur trade, and the vegetation change that has occurred in the montane.

The CER project contributed to challenging the idea of wilderness and what that means in Jasper, and the interconnection between ecological integrity and cultural considerations (Ibid, p. 98, 103). Restoration is a principal aim of the project, and depends on historical knowledge of landscape conditions and processes. "Good ecological restoration depends on understanding human values and practices, economic and institutional pressures and opportunities, and political structures and processes" (Ibid, p. 43). One aim of the project was to examine ecological restoration as a management policy: "Ecological restoration is a viable model for managing wilderness national parks" (Ibid, p. 37). The other principal aim was to understand the history of the montane ecoregion of JNP. This combination of historical and ecological knowledge, as detailed in the CER project, will advance the practical and theoretical understanding of ecological restoration (Ibid).

The Athabasca River Valley during the fur trade was one sub-project of the CER project, and it was conducted by MacLaren and described in his "Cultured Wilderness in Jasper National Park" (1999). MacLaren discusses more than just the history of wilderness, he details many influences on the UAV and the context of wilderness in national parks. He describes the formation of a wilderness ideology in the UAV in three parts: through the removal of the Aboriginal community at the time of park establishment, the perception of wilderness by the explorers and travelers through the area, and the institutionalization of the wilderness concept in the development of the park.

The removal of the Aboriginal community was tied to the belief that permanent Aboriginal occupation and a wilderness park could not co-exist. "Sovereign in right of the Crown, the valley becomes the site of a disturbing paradox in which the impersonal national collectivity dispossesses its personal predecessors by abjectly and summarily identifying them as criminals" (MacLaren, 1999, p. 21).

MacLaren describes how the development of Jasper National Park was connected to the idea of a wilderness destination for the wealthy. The construction of Jasper Park Lodge and its golf course, along with the importation of top soil from the prairies near Edmonton, and piped water for the fairways from Signal Mountain, was essential to attract the type of tourist desired by federal officials for national parks (MacLaren, 1999, p. 27). Golf was a favourite pastime of the wealthy, and golf courses were not yet viewed as contrary to the aims of wilderness parks. "The construction of a golf course in a national park/pleasure ground posed no ideological conundrum: with the edict then in vogue that courses could be designed to complement 'naturally' the non-human character of a setting... golf was thought of as being just as suitable for recreation in wilderness as any number of activities: hiking, sport fishing, horseback trips, mountain climbing..." (Ibid, p. 28).

MacLaren describes how the institutionalization of wilderness in Jasper, through the removal of the Aboriginal people, the building of railways, tourism, and golf course construction, was furthered through the cessation of ecological processes, particularly fire. "Far more than tourism, however, policies of fire suppression and prevention have been effecting greater ecological influence by man on the montane regions of JNP than anyone understood until the second half of this century" (Ibid, p. 37). MacLaren attributed the desire for heavily forested wilderness in national parks to a sense of guilt connected with the over-development of the landscape outside park boundaries (Ibid, p. 38). The vegetation composition change in JNP during the twentieth century concluded MacLaren's study, and helped reveal the co-existence of the human and non-human and the paradox of wilderness.

> The idea that ecosystems can manage themselves if human presence is constrained or carefully segregated also informs this understanding, for it appears that the protection, restoration and even enhancement of biological diversity are arrested, threatened or precluded by human presence. Yet, the

> idea of what constitutes wilderness is a human idea, or, rather, a complex of contrary and contradictory ideas, which assert themselves relentlessly (Ibid, p. 41).

2.4.1.1 *Vegetation Composition Research*

Human practices throughout the twentieth century have altered the vegetation structure of the UAV. Rhemtulla's (1999) research, part of the CER project, examined the vegetation change in the montane region of JNP. This was done by comparing the historical survey photographs from 1915 taken by Dominion land surveyor M.P. Bridgland, and repeating the survey photographs with 1997-1998 photographs taken from the same survey station locations. These remarkable photographs clearly illustrate the changes in vegetation composition in the Upper Athabasca Valley during the last century. The photographs are a vital source of information for this study and are presented in chapter 4. Rhemtulla also analyzed 1949 and 1991 aerial photographs to describe and interpret the change in vegetation cover in JNP.

Rhemtulla's research revealed that forest encroachment into grasslands in the montane ecoregion of JNP between 1915 and 1999 had reduced the extent of grasslands to 25% of the photograph area covered in 1915 (Rhemtulla, 1999, p. 48). "Grassland, shrub, young regenerating forest stands, and open forests common on the landscape at the beginning of the century have declined in favour of closed canopy coniferous forests" (Ibid, p. 85). Along with climatic factors the parks previous system of fire suppression is widely recognized as having influenced vegetation dynamics, and contributing to forest encroachment. "In Jasper, there has been a continuous decline in structural heterogeneity within coniferous stands over the past eighty fire-free years, and an overall increase in crown closure of closed coniferous forests" (Ibid, p. 9).

Rhemtulla also describes the change in forest cover types between 1915 and 1997. The herbaceous cover decreased by 50%, while the open forest types decreased, and the forest canopy cover increased. The total forested area increased from 50 to 65% (Ibid, p. 48). The decline in shrublands and more open canopy forests, caused the forests to increase in both size and in density. The historical and repeat photographs clearly depict this change in the landscape.

> If a low intensity, high-frequency fire regime was indeed characteristic of the montane ecoregion, as fire history studies suggest, high fuel accumulation such as that visible today would probably have been uncommon. Frequent low-intensity ground fires would maintain open forests and patchy early successional vegetation, and prevent the kind of fuel accumulation visible in the valleys today (Ibid, p. 54).

There may have been factors other than the suppression of fire which impacted the vegetational shift in the UAV such as shifts in climatic cycles and climatic changes. The precise role of climatic change in Jasper is not known, but it is likely that climatic factors would influence the predominance and range of particular plant species. The glacial advances of the Little Ice Age reached a maximum during the early 18th to mid-19th centuries likely resulting in cooler temperatures (Ibid, p. 54); however, the impact of a cooler climate on fire frequency is not completely understood. "Several studies have found that the cooler climate associated with the Little Ice Age corresponded with a decrease in fire frequency during that time in the Canadian Rockies; more recent research in the boreal forest of eastern Canada suggests that fire frequency was higher during the Little Ice Age than during the warmer period which followed it" (Ibid, p. 55).

Rhemtulla's study demonstrates the timeliness of historical ecological studies. These studies offer to Canadian national parks another available insight toward the achievement of ecological integrity management goals. By examining changes wrought on the landscape in the past, whether through climatic, anthropogenic or other factors, management goals for the future can be established. "In addition to our intervention in fire processes in the park, the construction of transportation and utility corridors, and various other infrastructure has either directly replaced existing natural vegetation, or affected the processes which shape it" (Ibid, p. 55). The CER project and its component sub-projects are examples of important studies that examine the intertwining of people and ecological systems.

The conceptualization of the relationship between humans and the environment has evolved within Parks Canada. Management policies have changed to reflect a greater understanding of the connection of the human and the natural. This next section outlines the engagement between humans and the natural world, as evinced in ecological anthropology.

2.5 Ecological Anthropology

> Although we may distinguish as classes the physically constituted from the culturally constructed, the two classes are not always, and usually cannot be, separated in nature (Rappaport, 1999, p. 458).

The focus of ecological anthropology is to study the relationship between humans and their environment, as represented in myriad cultures. Ecological anthropology passed through many phases of thought as it developed. A brief overview of several aspects of ecological anthropology is presented here, as many developments within the discipline have occurred in the last fifty years. Ecological anthropology attempts to explain cultural behavior by relating it to the physical world. During the 1950s, Julian Steward constructed an evolutionary theory he called "cultural ecology" which proposed that environments influence human behavior, population numbers and settlement patterns. Steward's cultural ecology focuses on the interrelationship of technology and environment, analyzing subsistence patterns, and the effect of these patterns on other cultural aspects (Steward, 1955, p. 40). Steward views social institutions from a functionalist perspective, that is that institutions provided solutions to subsistence problems (Moran, 1990, p. 10). Steward and other ecological anthropologists have been criticized for their focus on the environmental affects on cultures, while ignoring the cultural affects on the environment (Lewis, 2002, p. 22).

In the 1960s, ecological anthropology concentrated on the ways that cultural adaptations to the environment benefited human communities (Kottak, 1999, p. 23). Vayda and Rappaport focused on a systems approach to ecological anthropology, and applied ecological concepts to human societies. Vayda described two ways by which culture and environment are related: cultural behavior can function as part of a system that includes environmental occurrences, or, alternatively, environmental phenomena may be responsible for the development of cultural behavior (Vayda, 1969, p. xi). Rappaport studied the interaction between religion, culture and environmental regulation (Rappaport, 1999). Rappaport is renowned for his studies of the ritual use of warfare as a means to regulate human and pig populations among the Maring speaking peoples of New Guinea (Rappaport, 1969, p. 181).

Harris developed a cultural materialist approach to the human-environment connection during the 1970s. Harris' work centres on the development of infrastructure as a fundamental aspect of human adaptation. Harris connects the sacred nature of the cow in India to the role that dairy products play in Indian diets and the importance of cattle for ploughing purposes (Harris, 1974, p. 15). Harris has been critiqued for an overemphasis on the function of institutional infrastructure.

The theoretical breadth of ecological anthropology extends into many subjects. The investigation of native thought and classification systems is the focus of ethnoecology, such as research respecting the traditional medicinal uses of plants among Aboriginal communities in western Canada (Turner, 1999). Radical ecology and ecofeminism are some of the more recent aspects of ecological anthropology with their emphasis being on the links between ecology, advocacy, human rights and women's rights (Plumwood, 1994).

The concept of the influence of hunter-gatherer-foragers in the construction of their environments has not been a subject of study until relatively recently. Omer Stewart was the first anthropologist to examine the concept of the human ability to construct a desirable landscape through the deliberate use of fire (Stewart, 1954). However, the last thirty years have provided many studies that focus on the human construction of landscape. Traditional ecological knowledge, fire management research and systems theory are important for my study and are explored in more detail.

2.5.1 *Traditional Ecological Knowledge*

An important concept for this study is traditional ecological knowledge. The appreciation for the importance of traditional ecological knowledge within academia has dramatically expanded since the 1980's. The traditional ecological knowledge of the local people has expanded the intellectual ecological resource base. Traditional ecological knowledge has several levels of analysis: the local knowledge of land, plants and animals; land and resource management systems, which include principle ecological practices and tools; social institutions, that set use rules and codes of social conduct; and worldview, which shapes perceptions and gives meaning to environmental observations (Berkes, 1999, p. 14).

Traditional ecological knowledge and scientific knowledge are based on different principles of engagement. Scientific knowledge is primarily concerned with causality. The measurement of observable effects is believed to provide future predictability, and thus meet the management goals. Conversely, traditional ecological knowledge is based on multi-generational (i.e. longer term) knowledge of the inner workings of an entire system, and the interchange between the systemic elements (Freemen, 1992). Traditional ecological knowledge is a complex of knowledge, practice and belief (Berkes, 1999, p. 163). This understanding of how ecological systems work, and the many factors that influence and are influenced by the system, can complement the causal knowledge of western science. "The endeavor to learn more about non-Western science is thus as important to First World peoples as it is to those who occupy the margins" (Hayles, 1995, p. 60). Gathering techniques and the use of controlled fire are examples of traditional ecological knowledge.

2.5.2 *Traditional Fire Use and Management*

Some North American Aboriginal communities used fire as a tool both for ecosystem management and for social benefit. Omer Stewart describes fire applications as "The critical factor in determining the 'natural' vegetation" (Stewart, 1954, p. 318). The use of fire could provide a broad resource base for gatherer-hunter peoples through encouraging landscape variation (Lewis, 1985, p. 77). In recent decades, anthropologists have come to learn more about the land use practices of Aboriginal communities in B.C., Alberta and the western United States. Judicious harvesting, weeding, pruning, corridor development and fire management regimes have been investigated in detail. These land use practices modify plant communities to produce qualities that human societies value, though desirable plant communities vary from one human community to another. "The absence of domesticated plants from a population's subsistence base does not necessarily make them foragers. Such a view is too simple. It inaccurately portrays the relationships between many societies and their constructed environments" (Marshall, 1999, p. 184). In terms of food production, judicious harvesting and fire regimes can improve the harvest of roots, shoots and berries, by way of both more profligate distribution of plants and larger harvests of roots, berries and greens. Gathering techniques like the digging of roots can strengthen the growth and soil-holding properties of the roots. (Ortiz, p. 206) Moreover, some plants require disturbance to thrive, or even to reproduce and survive, and gathering techniques can have a disturbance role.

Research has described the use of fire technology by Aboriginal communities to create a fire mosaic. The fire mosaic provides greater abundance, predictability and diversity of plant and animal resources. Fire yards are openings in forest that are maintained with fire, while corridors are the areas around streams and trails that are maintained by fire (Lewis and Ferguson, 1988, p. 61). Lewis describes the fire mosaic as "All yards and corridors"(pers. comm. H. Lewis, July, 2002).

> As has been shown for hunter-gatherers elsewhere in the world, the Indians of northern Alberta understood, and many still understand, the complex networks of plant-herbivore-predator relationships. The comments by informants often reflected the broader understandings about the connections between fire, plants, animals, and human practices (Lewis and Ferguson, 1988,p. 70).

The use of fire in Aboriginal land management practices requires the knowledge of when, and when not, to incorporate it. In the northern Alberta Peace Region, studied by Lewis and Ferguson, the preferred time for controlled fires is early spring; at this time, the moisture levels are such that grasslands can carry a fire but forests can not. The hot and intense fires of summer are recognized as dangerous, and the use of a spring fire can preclude an uncontrolled large lightning fire during the summer (Ibid).

Controlled fire technology draws animals into burnt areas, eases the travel burden, and improves the quality and production of roots and berries. The abundance and variety of plants and animals, herbivores, predators and fur-bearing species are all increased through controlled burning (Ibid, p. 69). Controlled fire technology is an integral feature to hunting, trapping, and gathering in regions of limited resources, such as the boreal forest and the montane ecoregion of the UAV. Studies into the fire technologies of Indigenous peoples in Australia and California have shown similar benefits in those limited resource areas (Ibid, p. 74).

Plant materials used in basketry can also be modified with either pruning or with the proper application of fire. Kat Anderson (1999) discusses how Aboriginal Californians used pruning and applications of fire to produce the desired qualities of shoots of redbud, willow and other plants used to make baskets. The basket weavers required the shoots to be long, flexible, straight, with the right colour and no blemishes. It is the one to two year stems which produce the shoots of the right quality for basket weavers. As the plants age, the branches become more prone to blemishes and they branch laterally. Fire regimes can maintain the one to two year old growth of these plants. As well, regular burning prevents an accumulation of fuels which can cause very hot fires that might kill the entire plant. A light fire every few years will burn off the above ground branches, but will not kill the plant, and it will cause the plant to produce new, young shoots (Anderson, 1999, p. 83-93). This same principle is applied to burning along streams for browsing deer or moose. The fire removes the older branches which allows for the growth of the fresh young shoots.

Proper applications of fire, pruning or harvesting techniques help the plant(s)/plant communities to produce more abundantly. Many edible roots, berries and greens are enhanced by fire. Roots in particular become larger in size with fire, which greatly eases the amount of labour required during gathering. "Julia Kilroy, for example, recalled having seen some bulbs of tiger lily... the size of tennis balls from a place where the area had been burned over the previous year, and attributed the immense size to the burning" (Turner, 1999, p. 202). The concomitant abundant production benefits not only the humans who collect the plants, but also benefits animal use and the reproductive processes of the plants themselves. "[Controlled burning] wasn't just done for the good of the gatherers. It was done for the good of the forest." (Ortiz, 1993, p. 205)

In discussing the uses of controlled burning among First Nations of northern Alberta in the Peace River region, Lewis states:

> The Indians of northern Alberta are well aware that a diversity of habitats is important for maintaining a range of resources. They are also cognizant of the interrelationships, particularly as they involve animals, between different habitat types as well as the characteristics of habitats at different stages of succession. There is, certainly, an awareness of an interrelationship of parts, what we would call a system, and they fully understand the role of fire for alternately changing and maintaining a variety of plant communities at variable stages of maturity (Lewis, 1985, p. 77).

Fire regimes, pruning or other techniques for the modification of plant production are instrumental in the creation of areas where the stage of plant succession can be known in advance. These modification techniques provide a predictability to the landscape. Gathering requires knowing which plants to gather at the right time, planning uses within and between human groups, land maintenance, local knowledge, and creating and maintaining social ties. Gathering is a complex process it is not simply a matter of picking plants off the ground. Hunn (1990) states:

> Roots, berries, and greens can be harvested only at certain times and places. Careful planning is essential so that one may be at the right place at the right time, as is cooperation among women, both for the sake of company and for assistance in acquiring the knowledge on which successful gathering depends (p. 209).

The use of controlled fire to modify the landscape has been described as technology, a body of knowledge used to benefit human communities by creating or maintaining desirable landscapes (Lewis and Ferguson, 1988). The social context of this technology is integral to its function. When fire is viewed as a tool, or technology, it is not merely a frightening and destructive element but a necessity. From an Aboriginal perspective fire is a necessary part of ecosystem management that is better utilized under controlled conditions than uncontrolled. The specifics of fire use varied among Aboriginal communities. The times and techniques of fire use by the Aboriginal homesteaders in the UAV are discussed in chapter 4.

2.5.3 *Systems Theory and Sentient Ecology*

Recent ecological anthropology research is directly relevant to a discussion of the relationship between humans and their environment. Systems theorists Gregory Bateson, and more recently Tim Ingold and Mark Nuttall have contributed to this discussion. Bateson's discussion of the patterns which connect humans and the natural world is presented below:

> Their ideas about nature, however fantastic, are supported by their social system; conversely, the social system is supported by their ideas of nature. It thus becomes very difficult for the people, so doubly guided, to change their view either of nature or of the social system. For the benefits of stability, they pay the price of rigidity, living, as all human beings must, in an enormously complex network of mutually supporting presuppositions. The converse of this statement is that change will require various sorts of relaxation or contradiction within the system of presuppositions (Bateson, 1979, p. 159).

Bateson firmly connects the social system of a human society to the concepts of nature. Modifying a society's conception of nature also requires alterations to the social system which created those concepts. Systems theory regards human society as an intrinsic part of the physical world, both influencing, and influenced by, nature. Ingold articulates the deep connection between humans and their environments in this way: "Yet environments, since they continually come into being in the process of our lives - since we shape them as they shape us- are themselves fundamentally historical" (Ingold, 2000, p. 20).

David Anderson developed a concept called "sentient ecology" which refers to the complexity of knowledge acquisition and application amongst reindeer hunters and herders in Siberia (Ingold, 2000). "Sentient ecology" reflects the interaction between world view, knowledge and management systems. Ingold states:

> This notion [sentient ecology] perfectly captures the kind of knowledge people have of their environments that I have been trying to convey. It is knowledge not of a formal, authorized kind, transmissible in contexts outside those of its practical application. On the contrary, it is based in feeling consisting in the skills, sensitivities and orientations that have developed through long experience of conducting one's life in a particular environment (Ibid, p. 25).

Sentient ecology is part of the worldview of a particular human community; it cannot be estranged from the people who develop it. Nor can sentient ecology be generally applied to foreign environments. It is a specific complex of knowledge, practices and beliefs.

Ingold's discussion of the human-environment relationship theories delves into a realm that has been a focus in research but he, and other recent scholars, more fully conceptualize the importance of the relationship. Ingold reflects on the deep connection between humans and their environments and dismisses the notion of a possibility of separation between humans and nature.

> For hunter-gatherers as for the rest of us, life is given in engagement, not in disengagement, and in that very engagement the real world at once ceases to be 'nature' and is revealed to us as an environment for people. Environments are constituted in life, not just in thought, and it is only because we live in an environment that we can think at all (Ibid, p. 60).

Engagement with an environment is a result of learning to see important things and acquiring the skills necessary to survive and maintain this relationship between people and place (Ibid, p. 55). Engagement does not happen instantly; it is a lengthy process of perception and interaction.

Nuttall discusses the relationship between humans and the environment in the Arctic. The more recent global focus on environment issues has brought Aboriginal representations of the human-environmental relationship into the management strategies of both renewable and non-renewable resources (Nuttall, 2000, p. 378). It is important, however, to recognize the complexities of relationships between humans and landscapes, and to examine changes over time as well as between groups. "Not all Greenlanders, Saami or Canadian Inuit, for example, have the same visions of the future, and this reflects the cultural diversity to be found across the Arctic" (Ibid, p.

379). The necessity of examining the particulars of the relationship between a specific community and their specific environment is a long-standing concept in anthropology. As Nuttall discusses, humans are "[a] conscious agent interacting with the social and natural environment" (Ibid, p. 391).

A generalization of the human/environmental relationship between the "good" Aboriginal beliefs and practices and the "bad" European must be avoided. There is great variation and complexity among groups respecting their affect on the landscape over time, and the concepts that guide their land uses. Aboriginal peoples have vast and complex knowledge of their environments. Like all peoples everywhere, this interaction must be studied in specific terms. "Their actions, while perfectly reasonable in light of their beliefs and larger goals, were not necessarily rational according to the premises of Western ecological conservation" (Krech, 1999, p. 212).

The view of humans as separated from nature, expressed through the term "wilderness", has resulted in research where humans are considered in isolation from the environment. "It is perhaps significant that scientific concepts of ecosystem are deficient in the description of and analysis of such human-in-nature systems. There is no single, universally accepted way of formulating the linkage between social systems and natural systems" (Berkes and Folke, 1998, p. 9). In western science, there are human actions and there are natural actions; however, the use of fire, and other traditional ecological knowledge institutions, by Aboriginal peoples to deliberately manage and manipulate ecosystems contradicted these earlier traditional scientific presumptions.

> The materials I have presented establish that aboriginal man has had a tremendous and decisive influence on several aspects of his physical environment...The evidence that others have collected now makes it mandatory that we start with the assumption that nearly every area in the world has been modified by ancient man. Wherever and whenever man has occupied a region, the chances are that the flora, fauna, climate, and soil have responded to culture in some measurable and important manner (Stewart, 1954, p. 248).

Anthropologists and environmental historians, among others, are increasingly recognizing the importance of a greater knowledge of the interaction between human communities and the rest of the natural world. Cronon discusses how, rather than categorizing human-induced environmental changes as necessarily disruptive, the rates and types of change need to be explored (Cronon, 1990, p. 1128). The link between humans and their environment is as vibrant today as it was at the dawn of our species.

The connection between humans and their environment has become a focus of research studies in many fields. "Nature today speaks in manifold and unforethinkable voices and, most important perhaps, in voices that are always responses to our own" (Borgmann, 1995, p. 42). Historical ecology examines the bond between humans and the landscape from an historical perspective, and ecological restoration applies historical knowledge to the physical world.

2.6 Historical Ecology and Ecological Restoration

> "Very slow changes become perceptible only by a combination of scanning *and* bringing together observations from separated moments in the continuum of time" (Bateson, 1979, p. 79 emphasis in original).

Historical ecology is a relatively new scholarly fusion of ecology, history and anthropology that recognizes the influence of the historical states of an ecosystem on the current ecosystems' condition. The affect of history on ecosystems is illustrated through the interaction between management systems and landscape characteristics. Modification practices, like prescribed fire, are examples of such interactions. Kottak notes: "An innovation that evolves to *maintain* a system can play a major role in *changing* that system" (Kottak, 1999, p. 33, emphasis in original). This principle applies to traditional land management practices, and seems especially relevant to historical ecological studies. As discussed previously, the interaction between humans and the environment, and the Western preoccupation with the idea of a wilderness untouched by humans, has strongly influenced the development and management of national parks. Crumley describes the ideology of the human separation from nature in this way: "The contradiction is this: the first part of the story of the human species is couched in evolutionary and environmental terms, the second denies environment a meaningful role in human history" (Crumley, 1994, p. 2). Studies in historical ecology emphasize the affect of history, including human history, on the landscape.

Historical ecology is important to the development of management policies that encourage Parks Canada's ecological integrity management goals. For management to determine whether an ecosystem has integrity knowledge of its historical conditions is absolutely necessary. "Past and present human use of the earth must be understood in order to frame effective environmental policies for the future; this necessitates deft integration of both environmental and cultural information at a variety of temporal and spatial scales" (Ibid, p. 9). Knowledge of historical conditions provides a point of reference for the current state of the landscape and the impact of past and current human uses. At the same time, knowledge of landscape history provides a framework upon which management can build comprehensive land use policies. The choice of a management framework impacts upon the policies that can be enacted. Patterson makes the following comment about institutions and practices:

> Whether existing institutions and practices are reproduced or new ones are constituted rests on the capacities of groups of actors to overcome the constraints and contradictions that exist and are revealed at particular moments. From time to time, history presents real alternatives in which the actions of actors occupying particular places in structures do make a difference (Patterson, 1994, p. 232).

Managing for ecological integrity may require restoring damaged/disturbed/stressed ecosystems. But how can managers know if an ecosystem is stressed? Knowledge of the historic range of variation of the ecosystem will help determine when and how to restore it.

> What are we after in a place like Jasper? Should we allow natural and cultural processes to proceed without regulation? Should we use management practices to mimic or amplify natural processes.... At least one thing is clear: cultural beliefs, threaded through a labyrinth of institutions and shielded increasingly from direct experience, impinge on ecological management" (Higgs, 2000, p. 196).

How humans conceive of their relationship with nature influences how they relate to nature, both conceptually and practically. If humans and wilderness are not viewed as mutually exclusive, the possibility exists for humans to manage responsibly and restore wilderness. "The creative ambiguity that exists here is a blessing because it reveals to us the extent and thickness of the cultural layers we impose on top of wild nature. It offers a new way of seeing wilderness, one that admits of human practice in its myriad forms" (Higgs, 2000, p. 201).

Ecological restoration is a field closely connected with wilderness history and historical ecology. Restoration of ecological systems may be necessary, even in wilderness areas or national parks, when an area has been degraded. Good ecological restoration is site specific, and involves negotiating the best outcome for a site based on ecological knowledge and the varying perspectives of shareholders (Higgs, 1997, p. 339). There has been much debate over what ecological restoration is and how to define it in general terms. The Society for Ecological Restoration defines it in this way: "Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed" (SER, 2002, p. 2).

Understanding the trajectory, importance and worth of ecological restoration requires recognition of the history of ecological restoration and its social context, particularly the concept of redemption. Redemption refers to the ability for humans to redeem themselves from past ecological errors through good ecological restoration projects (Higgs, 1997, p. 342). The success of a restoration project depends on its' meeting the criteria of ecological fidelity. Ecological fidelity is an essential part of restoration and entails three basic principles: structural and/or compositional replication, functional success and durability (Ibid, p. 343). A restoration project without these basic principles cannot be deemed restorative.

There are five important considerations related to assessing successful restoration: historical, cultural, social, political and aesthetic. "A significant focus in restoration... ought to be bringing back into harmony the relations between sustainable human practices and ecological functions... ecologists miss an important constituency if the role of humans in ecosystems is ignored (Ibid, p. 345). These considerations provide a framework for analyzing the restoration project and the interaction between the landscape and humans, both modern and historical. In addition, reference ecosystems are important. They help to provide a framework for the analysis of the restoration process and the ultimate success or failure of a project. "A reference ecosystem... serves as a model for planning a restoration project, and later for its evaluation... the reference that is selected could have been manifested as any one of many potential states that fall within the historic range of variation of that ecosystem." (Ibid, p. 6).

The Society for Ecological Restoration describes nine attributes to a restored ecosystem, some of which are more readily measurable than others. A restored ecosystem contains a characteristic assemblage of species, the majority of which are indigenous; all functional groups are represented; the populations are capable of sustaining reproduction; the ecosystem apparently functions normally; the ecosystem is integrated into a larger ecological landscape; the potential threats to health and integrity have been eliminated or reduced as much as possible; the ecosystem is sufficiently resilient to endure normal periodic stress events; and the restored ecosystem is self-sustaining to the same degree as its reference ecosystem (SER, 2002, p. 3).

Evaluation is an integral part of a restoration project. Without evaluation there is no means of securing information about the success or failure of the process, making it difficult to ameliorate problems that may arise. There are three evaluation strategies for ecological restoration: direct comparison, where selected parameters are measured in the reference ecosystem; attribute analysis, where the nine attributes of restored ecosystems are evaluated for that particular site; and trajectory analysis, where data collected periodically at the restoration site are plotted to establish trends (Ibid, p. 8). Planning and costs are significant influences on successful restoration projects. They are closely tied to the interests of the stakeholders, and the resources at their disposal. Ecological restoration is sometimes just one of many elements in a larger project and planning complexities and costs are important considerations (Ibid, p. 9).

2.7 Discussion

The concept of wilderness guided the establishment of national parks. The impact this concept has had on the landscape, and on Aboriginal communities, notably the community that called the UAV home, is significant. The establishment of national parks was connected to the larger worldview of Canadian society and to the desire to showcase mountain regions to the affluent. The recent change in management paradigms, away from intervention to managing for ecological integrity, has had a significant affect on park managers' outlook towards history, fire and Aboriginal people.

The contributions of ecological anthropology, traditional ecological knowledge, historical ecology, and ecological restoration toward expanding the perspective on the relationship between humans and the landscape are significant. The historic ignorance in park management of the importance of the environmental modification techniques used by humans for millennia, and the impact of these techniques on the landscape, is in part remedied through research projects in parks. The influence of historical conditions on current ecosystems, and their role in determining restoration needs are more readily recognized as important to park management today than in the past. The CER project in Jasper is an example of the value of historical knowledge for establishing and attaining restoration goals. The sub-projects of MacLaren and

Rhemtulla depict the role of history in the creation of the landscape. Rhemtulla utilized the innovative technique of repeat photography to depict landscape change.

The opposing worldviews of Aboriginal communities and national parks management are representative of a divergence in philosophy and social institutions. For the national parks active management was not appropriate in a wilderness, for Aboriginal communities managing the land improperly was not appropriate for a homeland. These perspectives have a long development history involving the concepts of the proper use of land and the proper role for people in the natural world. These attitudes impacted land management and were instrumental in the creation of the Upper Athabasca Valley landscape. The Bridgland and repeat photographs vividly illustrate the difference these viewpoints had on the land; the 1915 landscape is a different place than the wilderness of today.

Humans shape their environment, they make choices and must recognize the consequences. In the wilderness of North America, the concept of consequences was lost in the rhetoric of an unpeopled landscape. The landscape was peopled, however, and the engagement of a people with a place is illustrated through their management choices. Traditional ecological knowledge requires a multi-generational perspective with a focus on knowledge of whole systems and the interchange of elements. The management choices that follow such an understanding allow for active management of the landscape as a whole, as well as its' component parts. These management forms include gathering and hunting techniques, controlled fire, and most importantly, the knowledge and comprehension of the complex interactions at work that produce a diverse and sustainable landscape.

The change in institutions from the Aboriginal homesteaders to the national parks system has had a physical impact on the landscape, and will be discussed in chapter 4. The Aboriginal institution of a necessary interaction between the people and the land was replaced by an institution which denied the role of people in the landscape. With the imposition of the parks institution human uses became an obstacle to a healthy landscape. The institute of parks is rooted in the concept of fencing in, or bounding an area, and then preserving everything so tourists can view this landscape. The historical institutional shift has again shifted in the incorporation of ecological integrity and adaptive management. This intertwining of the human and the ecological affords new explorations of the types of engagement between people and the landscape in the history of national parks.

The concept of engagement is essential to this study. It goes to the very heart of an examination of the interaction of a group of people, and their disappearance, with their homeland in the Upper Athabasca Valley during the nineteenth century. The UAV was a place where people lived, and where they met their physical, emotional and spiritual needs. Ever since people first lived in the UAV, as either seasonal or permanent residents, there has been a relationship between humans and the landscape. This is just as true today as it was 12, 000 years ago. It is how that relationship is configured that changed over time. With the forced absence of the Aboriginal homesteaders from the UAV their former landscape changed.

The management paradigms of Canadian national parks have evolved in the last three decades. The ecological impact of choices such as active fire suppression, recreational development and animal species selection has given way to the ecological integrity paradigm and adaptive management. Accompanying this change in perspective are the efforts toward re-placing of people in the UAV landscape and acknowledgement of the role of humans in landscape processes such as fire. The integration of prescribed fire programs, managing the impact of residents and visitors, and an approach more inclusive of Aboriginal peoples are significant paradigm shifts.

The exclusion of Aboriginal peoples from the goals and management of parks impacted both the people and the landscape. The effect of the removal on the homesteader community from JNP in 1910 was deep, and will be described in more detail in chapter 3. The removal of the community affected the landscape: the loss of active management practices impacted the vegetation composition. The impact of this loss is still felt today. The interaction between social institutions and the landscape is well illustrated through the effect of the loss of the Aboriginal homesteaders from the UAV.

3. The Upper Athabasca Valley in the Nineteenth Century

"How we image a thing, true or false, affects our conduct toward it, the conduct of nations as well as persons" (Buell, 1995, p. 3)

3.1 Introduction

Human history and land use has been a part of the UAV since the last glaciers passed through the northern Rocky Mountains. The history of the landscape and the history of people are tied together. This connection is as strong today as it was one hundred or nine thousand years ago. It is the fusion between humans and landscape history that is the focus of this chapter.

Human history in the UAV is not a passive story. Where now tourists flock to ski or hike, people once hunted and trapped, ignited prescribed fires and in other ways actively lived in and had an influence upon this region. The affect remains, subsumed beneath the concept of a wilderness region untrammeled by people, all too often the popularly conceived notion of the history of any national park. During the nineteenth century, many decades before the establishment of JNP, various communities of people lived in and maintained their home - the Upper Athabasca Valley.

This chapter describes the nineteenth century in the UAV: the ecological influences on the landscape, from microclimate to fire ecology; a discussion of the fire ignition controversy and the prescribed fire program in JNP today; the archaeological evidence for the UAV; and the history of Aboriginal communities in the valley. A basic chronological approach to Aboriginal history was used, beginning the story of the Aboriginal communities with the archaeological record and then detailed through the nineteenth and into the beginning of the twentieth century. This information provides a picture of the life of Aboriginal communities in the UAV, although more information is available for the nineteenth and twentieth centuries than for the more distant past. The chapter concludes with the exodus of the Aboriginal homesteaders from the park.

3.2. Characterizing the Ecological Processes

3.2.1 Macro Processes

Microclimate in mountain ranges is influenced by a number of factors, all of which affect temperature: slope orientation, wind, elevation, hydration (Geiger, 1965, p. 369). Slope angle affects water drainage as well as the amount and kind of wind, and also affects evapotranspiration, or the evaporation of water, by plants and soil (Ibid, p.

250). A consequence of water drainage down-slope, caused by gravitational pull, means that plants near the bottom of slopes have greater access to soil water than those near the top. The strong upslope summer winds at the foot of the slope draw the cooler air away from the slope. Thus the highest temperatures near the ground are found at the valley bottom and on the flat mountain plateau, which are both protected by plant cover, and not on the steep slopes (Ibid, p. 419). The strong influences of water and warmth on plant growth make the mountain valleys most accommodating to human and animal needs. The differential effects of slope, wind, temperature, and moisture are greater at higher elevations (Ibid, p. 443 -450). The north-facing slopes are colder, the wind is stronger, and the temperature and moisture levels are lower as the elevation increases. The lower elevations of the mountain valleys, like the montane ecoregion in the UAV, have more favourable conditions for humans and animals in both summer and winter. In the winter the lower snow depths allow animals to access food and the forested areas provide shelter. Higher moisture levels and warm temperatures in the summer encourage plant growth.

Beyond local microclimatic variation, ecosystems are in a constant state of flux as the composition, structure and processes of an ecosystem alter in response to short-term and long-term changes (Landres, 1992, p. 299). There is a debate over whether ecosystems are naturally in equilibrium, i.e. an ecosystem can be disturbed or have resources extracted and will then heal itself over time and return to its "original" state. Or, alternatively, whether ecosystems are naturally cyclical and will respond to influences in this way. These alternate viewpoints frame an understanding of ecosystems and the relationship of humans and nature (Ibid, p. 301). "Ecosystems are constantly in a state of flux, although our limited human sensory abilities prevent us from observing much of this change" (Ibid, p. 299).

The concept of the natural or historical range of variation (HRV)[5] has been developed in the past decade. The HRV is the variation that exists due to changes or cycles in climate, disturbance, hydrology, usage and policy. The HRV concept recognizes that ecosystems are dynamic and complex and have a range of conditions that are sustainable, and when extended beyond this range, the ecosystem becomes unbalanced (Egan and Howell, 2001, p. 7).

---

[5] The terms "natural range of variation" and "historic range of variation" are often used interchangeably. I prefer 'historic range of variation" due to its emphasis on the role history plays in ecosystem variation.

Knowledge of landscape history is constructed from information about the specific range of ecosystem variation. Landscape history studies are defined according to a suite of variables that are unique to the research question and study area. For example, the history of grassland communities in JNP's montane ecoregion will require a different suite of variables than a study of the alpine forests. The human influences on these distinct ecoregions are different and, naturally, impact the specifics of history. The aim of characterizing the historic range of variability is to understand what processes drove the variation from one place to another within the study area, and how those processes influenced the current ecological system (Landres et al., 1999, p. 1180). This is an important concept in management, as the knowledge of the HRV of an ecosystem can contribute to the managers' ability to decide if, when and how to manipulate an ecosystem, in response to undesirable disturbance (Cole and Landres, 1996, p. 180).

It is important to establish reference conditions, as they guide the focus of restoration. Reference conditions are based on the structure of the ecosystem under study at particular points in time and in space. Reference conditions help to define a preferred ecological condition, determine the factors that caused the present degradation, and the factors that are involved in the successful restoration of the ecosystem to a preferred condition (Egan and Howell, 2001, p. 10). Knowledge of landscape history is essential in the restoration of unbalanced ecosystems. Selection of reference conditions requires knowledge of the causes and nature of variation in the ecosystem (White and Walker, 1997, p. 338).

3.2.2 Montane Ecology of Jasper National Park

The montane ecoregion has highly variable ecological conditions. Plant community types and their productivity differ according to local microclimatic, topographic, soil conditions, as well as plant composition. Generally, due to the preponderance and variety of edible herbaceous plants and plant parts, grasslands have a greater production of forage than shrublands. Shrublands have become more prevalent in the UAV in the last fifty years, due to both changes in human land use and active fire suppression.

The vegetation of the montane ecoregion in Jasper National Park includes trees, shrubs, plants, fungi, lichens and a variety of microorganisms. Some of these species are important sources of forage or provide shelter for animals; others are edible for humans, or have medicinal or other properties that were traditionally used by the human communities in the region (Willoughby et al., 2001, p. 17-19). There are also a number of alien plants, transplanted deliberately or accidentally.

The eight different grassland community types in the montane ecoregion of the UAV, described by Willoughby et al. (2001), are summarized in Table 3-1. The Fringed sage/junegrass community type is found on steep, south-facing slopes in the lower elevations of the river valleys near Jasper. This community type is widely distributed on the southerly-facing slopes of the Rocky Mountains from the Bow River valley and the UAV (Willoughby et al, 2001) northwards to the southerly-facing slopes of the Richardson Mountains in the Yukon (Bailey et al, 1992). The Northern wheatgrass-Sheep fescue type occurs on dry, steep south-facing slopes at slightly higher elevations than the fringed sage/junegrass type. The Juniper/northern wheatgrass-columbia needlegrass type is distinguished from other grassland communities by the high juniper cover. The Little clubmoss/richardson needlegrass type occurs on isolated south-facing slopes within the pine-spruce-fir forests and may be a distinctive grassland type characteristic of the moister grassland-coniferous forest ecotone in JNP. The Kentucky bluegrass-junegrass/dandelion community type is found on the moister level to lower slope positions, and is dominated by two plant species alien to JNP - Kentucky bluegrass and dandelion. The Bearberry/juniper type represents the forest-grassland ecotone, which has characteristics of both grassland and forest plant communities, on dry and rocky south-facing slopes in the river valleys of JNP. The Rose-snowberry type occurs on south-facing slopes, and represents the forest-grassland ecotone. It appears this community type is undergoing a transition to deciduous forest (pp. 52-59).

Table 3-1. Grassland Community Types in Jasper National Park

Community Type	Aspect	Elevation	Forage Production
fringed sage/junegrass	south	low	250-750 kg/HA
northern wheatgrass-sheep fescue	south	low	400 kg/HA
small leaved everlasting/junegrass	level	low	250 kg/HA
juniper/northern wheatgrass		low	250 kg/HA
clubmoss/richardson needlegrass	south		385 kg/HA
kentucky bluegrass-junegrass		level	1500 kg/HA

bearberry/juniper	south	low	500 kg/HA
rose-snowberry	south	low	750 kg/HA

The forage production of a plant community type affects the carrying capacity of a vegetation community and is important in the calculation of sustainable grazing capabilities. As indicated above, the grassland community types growing on moister soils have a greater forage production. An increase in the area of these productive grassland communities would increase the overall carrying capacity of the landscape for herbivores. In large part due to the suppression of fire since the formation of JNP the opposite is happening. Generally these grassland communities are now in transition to deciduous and coniferous forests. This trend is negatively impacting the overall forage production and herbivore carrying capacity of the montane ecoregion.

The grazing of herbivory over the past century and in the more distant past has influenced the HRV of the plant community types found today in the UAV. There has been little research conducted on this subject in the UAV, though the work of Bailey et al (1992) in the Richardson Mountains of the Yukon and Willoughby et al (2001) in the Rocky Mountains illustrates the affect of herbivore grazing on plant communities.

Grazing disturbance most affects forage productivity of plant species that are palatable to herbivores. One of the most widely distributed grassland communities in the UAV today is the Fringed sage-purple reedgrass community type. In the Richardson Mountains of the Yukon, the Fringed sage-purple reedgrass community type was common as a successional stage to the Purple reedgrass-fringed sage community type. In the lightly grazed Purple reedgrass-fringed sage community type, fringed sage was a minor component of the plant composition while purple reedgrass, northern rough fescue and northern awnless brome grass were prominent. Heavy winter and spring grazing by horses in the Yukon was found to be the primary cause of degradation of this community type. With this grazing pressure the community type altered, from one dominated by grasses and high quality forage producing plant species, to a community dominated by fringed sage, a shrub-like species unpalatable to horses (Bailey et al, 1992).

For the UAV, many of the plant species named as descriptors of particular community types are indicative of heavy to severe overgrazing by herbivores over many decades. Of the eight grassland plant community types described by Willoughby et al (2001), such prominent plant species include fringed sage, small-leaved everlasting, junegrass, juniper, bearberry, snowberry and the alien plants Kentucky bluegrass and dandelion. The shrubs are primarily unpalatable to herbivores while the herbaceous plants are very resistant to grazing injury. These plant species are reflective of grazing management problems in the parks system (pers. comm. A. Bailey, November 21, 2002).

Other than fire and grazing, there are disturbance factors that also influence vegetation composition. Climate, wind, insects, ice, hydrological patterns and flooding are some examples. A strong wind storm can disturb forest and affect forest stand age, wind throw events in the UAV have been recorded in 1943, 1976 and 1977 (Rogeau, 1999). Insects can be a disturbance factor, like the pine-bark beetle affecting forests in British Columbia. Ice storms have recently affected trees in eastern Canada. Future research projects in these, and other areas, will help to answer some of the questions regarding disturbance, disturbance elements and their affect on vegetation composition.

Climatic fluctuations like those seen in the Little Ice Age are also an ecological influence. There have been climatic fluctuations in the Upper Athabasca Valley since the recession of the Late Wisconsin glaciers about 10,000 B.P. Palynological and macrofossil evidence indicates that the vegetation cover between 9000-9600 B.P. was similar to that of the twentieth century, although the treeline between 5300-8100 B.P. was higher than during the twentieth century (Luckman et al., 1979, p. 27). Annual temperatures have increased in the Canadian Rockies during the last 100 years, and summer temperatures during the twentieth century are warmer than any period in the last 800 years. Glaciers have receded during this period, and the data indicate that climatic conditions in the late twentieth century are historically exceptional (Luckman and Kavanagh, 2000, p. 379). Studies have indicated that there is an upslope migration of the treeline, that is moderated by local microclimates and species (Ibid, p. 380).

3.2.3. Fire Ecology

Change in ecological processes like disturbances and climate are influences on the vegetation composition. "However, examination of photographic evidence suggests that there is considerable change in the vegetation of these forests that is driven, not by climate change, but by the absence of major forest fires" (Luckman and Kavanagh, 2000, p. 380). Like the factors of climate, soil, topography and elevation, fire is an elemental force that shapes vegetation composition and influences some soil characteristics, such as organic matter (Anderson and Bailey, 1980). Fire is a catalyst for biodiversity. In the absence of fire, forested communities usually lose biodiversity, excessive fuel accumulates, and stagnation and disease may become prevalent over time. Grassland communities may become stagnant and some are invaded by shrubs (Wright and Bailey, 1982, p. 1)[6]. Historically, fire has been a primal force in the northern Rocky Mountains, where most forests were established after fire disturbance (Ibid, p. 274). The montane ecosystems evolved with fire until the fire suppression policies implemented by government in the late nineteenth century.

Several components are necessary for conditions that will produce a fire. Fuel load and type, moisture levels, humidity, ignition source, number of fire locations, and wind speed are all involved in fire ignition. Fire will occur if three criteria are met: sufficient dry fuel, favorable weather and an ignition source (Bailey, 1996). All of the fuel and environmental factors affect both the fire temperature and the overall effect of fire on the ecosystem. Grassland fires are less intense than shrubland fires, due to both fuel type and load. Temperature ranges for grassland fires are 102-388 degrees Celsius (based on fuel loads of 1685-7865 kg/HA), while shrublands range from 300-1000+ degrees Celsius (Wright and Bailey, 1982, p. 9-12). The forest and shrubland fuels are usually filled with flammable volatile oils and the fuel loads are also heavier.

Topography and microclimate are factors in the effect of a fire on the landscape. The fires in level to rolling topography tend to be wider and more sweeping than those in steep and dissected topography. The dry south-facing slopes are more susceptible to burning (Ibid, p. 288). Upslope winds can cause a fire to spread intensely and rapidly on steep slopes (Kay, Patton and White, 1994, p. 5-22). Valley orientation is also important for wind direction and fuel continuity. The orientation of the UAV is from the southwest to the northeast. The predominant wind direction in the northern Rockies in the summer is from the west to southwest (Ibid, p. 5-22). High winds contribute to a fast and wide spreading fire. With a valley orientation towards the northeast, the UAV is a prime location for fire spread due to predominant westerly winds. These factors influence the vegetation composition, which is reflected in the occurrence of grassland plant species on the south-facing slopes of the river valleys in JNP as described in Willoughby above.

---

[6] A stagnant grassland has fewer plant species and an accumulation of plant litter both of which negatively affect the forage production of the area.

The removal of litter, blackened landscape and increased soil temperature following fire enhances the nitrification of organic matter in the soil and sometimes increases the forage yields of grasslands. Increased soil temperature promotes plant germination. The average temperature differential between burned and unburned grassland sites is 10 degrees Celsius, due to the reflection of solar radiation in unburned areas. In addition the higher temperature encourages the breakdown of organic matter (Wright and Bailey, 1982, p. 27). The temperature differential remains for at least one growing season (Anderson and Bailey, 1980, p. 987). Two to three growing seasons after a fire fresh mulch again accumulates on the soil surface and the recycling process of organic matter is renewed. Once on the surface, herbaceous litter takes about three years to decompose, and mulch levels return to normal on grasslands within five years after a fire (Wright and Bailey, 1982, p. 28).

In the northern Rocky Mountains the historical fire cycle maintained an open forest cover condition in Douglas fir stands. Historically the most common fires were ground fires, with the occasional crown fires in areas of heavy fuel accumulation in combination with extremely dry and windy conditions (Ibid, p. 283). The dominant vegetation of Douglas fir/lodgepole pine is resistant to surface fires. Overall the native plant communities in the region are fire-dependent, meaning that not only are the plant roots able to survive fires, many need fire to thrive and to reproduce. Natural selection has favoured development of flammable characteristics in the vegetation of this region (Ibid, p. 241). The short fire cycles (less than 50 years) that occurred in the montane ecoregion of the Canadian Rockies are an important factor in the growth and persistence of vegetation communities dominated by grasses, Douglas fir, Lodgepole pine and trembling aspen (White, 2000, p. 46).

Climate and climate change also affect the fire cycle. The warm/dry and cool/wet fluctuating cycles over the last 500 years are influential, but the exact nature of climate on fire cycles is not yet known. Theoretically, the warm/dry cycle of the last hundred years should have resulted in an increase in the number of fires, and not a decrease (Kay, Patton and White, p. 5-22). However, cool/wet cycles may have necessitated the use of larger amounts of anthropogenic fire to prevent forest from encroaching into grassland (pers. comm. A. Beaudoin, March 28, 2002). There could also have been windows of time when conditions were dry enough to burn (pers. comm. P. Murphy, June 10, 2002).

The evolution of plant species in the montane ecoregion was dependent on climate, fire, and other ecological processes. The location of grasslands generally meant prior fires to prevent the encroachment of shrubs and trees. The Aboriginal communities who lived in the UAV for millennia appreciated the nature of the montane ecoregion, and used fire to create a desirable landscape: one composed largely of grasslands and open forests. The cessation of anthropogenic fires and the advance of widespread fire suppression in the late nineteenth and early twentieth century are factors in the fire cycles.

3.2.4 The Fire Ignition Controversy

The origin of fire ignition is a controversial subject for scholars examining the montane ecoregion of the eastern slopes of the Rockies. Two theories prevail at this time: the lightning fire ignition and climate change model, and the human-ignited fire model. The first suggests that mid-summer lightning fires dominated the historical fire regimes. This theory proposes that fires were infrequent, large and intensely hot, and that recent reductions in burnt areas are due to climatic changes. Some fire frequency studies indicate that the forest stand age is primarily determined by a few large fires. Thus the occasional lightning fire is viewed as a primary factor in forest stand age (Miyanishi et al., 2000, p. 18). The other theory suggests that human-ignited fires were common in the montane ecoregion, and the reduction in burnt areas reflects changes in human uses (White, 2000, p. 46). The debate is fueled by incomplete research on fire history and occurrence data.

On one level, the disagreement over ignition source in scientific circles is a philosophical debate. Participants represent one side of the argument exclusively and deny validity to the alternate point of view. Some researchers believe that any account of Aboriginal fire use are widely exaggerated and highly unreliable (i.e. Johnson and Larson,1991), others feel the same way about lightning fires (White, 2000). "The most significant problem with this argument is that Indian-caused fires cannot be substantiated. It is hard to find well-documented evidence about why Indians would have caused fires as a part of their lifestyles" (Johnson and Larson, 1991, p. 200). Conversely, the type of evidence for Aboriginal burning practices may not be accepted by some other researchers. Dendrochronological studies may be perceived to be objective while oral traditions are perceived as subjective or anecdotal. "Information on the influence of Indians on the fire frequency is incomplete and lacks the objective and systematic evidence that can be marshaled for European and climate effects" (Ibid, p. 199). There are problems with the accuracy and reliability of many sources, including dendrochronological studies.

Part of the problem with the ignition source debate is the focus of some researchers on particular data sets. For example, dendrochronological studies are not complete fire histories, they are a record of fire scars on trees. Studies have described how a fire scarred tree may not reflect the occurrence of all fires in a region. Several factors influence the scarring of a tree during fire. The fire must be hot enough to scar, but not kill, a tree; and, during every fire some areas burn more intensely than others. "Although at least one tree in each type and treatment was scarred by every fire, the majority of the trees exhibited an incomplete fire scar record... We believe our finding of fewer fire scars than the actual number of fires is due to fuel conditions and fire behavior rather than tree characteristics" (McBride and Lewis, 1984, p. 972). Given these limitations, dendrochronological data cannot be considered a complete record of fire history. At the same time oral histories of fire are not a complete record of the fire history of a region either; they are oral histories of fire use in the area and time period specified. These factors necessitate research which uses a variety of different sources.

JNP is in a lightning shadow cast by the Continental Divide. There is a much greater incidence of lightning-ignited fires to the west in British Columbia, and to the east in the Alberta foothills, than in the Alberta Rockies (Heathcott, 1999, p. 1). The Jasper fire occurrence database, which refers only to known fires in a sixty-six year period in the twentieth century, reveals that 18% of fires between 1929 to 1994 were ignited by lightning (Heathcott, 1995, p. 1). It appears there were no lightning fires in the northwest quarter of the park during the 66-year record period. This area includes the Smoky, Snaring and upper Snake Indian drainages. Lightning was also infrequent in the Miette, Maligne, Fiddle, Moosehorn, and lower Snake Indian drainages, and in the Rock Creek basin. The few lightning fires that occurred in JNP were concentrated in the lower valleys of the Athabasca (Ibid). Lightning occurs in the Rocky Mountains primarily in the summer months of July and August (Ibid). The patterns suggest that both lightning and lightning fires were rare events in Banff and JNP in the twentieth century (Heathcott, 1999, p. 5). How much of this information can be applied to previous centuries is unknown.

The occurrence of lightning fires in meadows was not examined by Heathcott; however, the summer timing of lightning coincides with the wettest periods in grasslands. Moisture is a significant factor in the ignition of a fire, regardless of ignition source. A wet area will not carry a fire, even if there is sufficient fuel. Grasslands tend to be green in the summer, and the higher levels of humidity negatively influence the ability of a fire to both ignite and spread.

Could the occasional summer lightning-ignited fire create the historically described landscape features of grassland and open forest in the UAV in the nineteenth century? Tande's (1977) fire history study demonstrated the frequency and intensity of fire events in the central part of the UAV. The generally frequent and patchy fires of mainly low to medium intensity do not depict a typical lightning fire pattern. A typical lightning fire pattern would consist of few fires that burned very intensely and covered a large area. Furthermore, White's fire history research about the timing of fire occurrences in meadows during the dormant season or spring, does not support a lightning-ignition postulation. With lightning occurring primarily in the summer months, existing season of burn data indicates lightning ignition to be unlikely. The prescribed burns that have been ignited in Jasper National Park occur in the spring or fall seasons, not in the lightning season of July and August. An in-depth examination of Tande, and the fire history of the UAV are discussed in detail in chapter 4.

The proponents of human-induced fire ignition are supported by traditional fire management research described in chapter 2. The statements from Aboriginal people who discussed their use of fire for vegetation management while they were growing up in the UAV (Moberly, 1980, interviews with AWN Elders) are most significant, as well as the histories of Aboriginal fire use in neighbouring vicinities including the Smoky River area and Banff National Park (Wuorinen, p. 30, White 2000). Whether anthropogenic fire in the UAV was temporally limited is unknown. Some scholars dismiss any findings of anthropogenic fire: "Unfortunately, trying to reconstruct prehistoric cultural burning practices such as burning by indigenous people has proved extremely difficult due to a lack of objective evidence" (Miyanishi et al, 2000, p. 19). The fire ignition debate raises some important issues about the reliability of the evidence, the implications of bias and the resulting extensive conclusions drawn from a small number of incomplete sources. Perhaps a more inclusive position is warranted:

the landscape of the UAV may reflect a complex interplay of factors over the centuries, including both regular human and occasional lightning-ignited fires.

3.2.5. Prescribed Fire Program in JNP

The great variety of ecosystems in Canadian national parks means that one fire management program cannot be implemented across the entire nation. Each park must assess its ecological conditions, history and requirements and implement fire programs that accurately reflect the local situation. Parks have essentially four options: low fire control with no use of prescribed fire, good fire control with no use of prescribed fire, good fire control and phased fire use and full fire management (CPS, 1989, p. 32). Jasper National Park has incorporated the third option, controlling wild fires while setting the occasional prescribed fire.

In the late 1980's prescribed fire programs were initiated in Jasper, Banff and Elk Island National Parks (MacCallum, 1989). A desire for a greater understanding of the short and long-term effects of fire on vegetation and wildlife led to a small number of prescribed burns. Methodology was developed to standardize procedures and subsequent reports, including pre-and post-burn inventory, vegetation and wildlife response measurement and subsequent monitoring, submission requirements and payment schedules. The prescribed fire program is still developing in JNP (pers. comm., D. Smith, July 2002).

Portions of the Henry House area were burned by parks staff in 1976 and again in 1988 (MacCallum, 1989, p. 1). The April 1988 prescribed fire had four objectives: reintroduction of fire, evaluation of fire behavior and effect, personnel training, and increased public awareness of fire management (Ibid). Natural firebreaks along the north, south and east perimeters were used for the 1988 prescribed burn, and a total of 64 hectares were burned. Overall the grass and herbaceous plant coverage increased after the fire, and the goal of 50% tree mortality was attained (Ibid, p. 11).

These early prescribed burning efforts were great opportunities for learning. Recommendations were made to refine the methodology, such as increased numbers of sample vegetation plots. Continuity in pre- and post-burn operations and personnel were also recommended after the 1988 fire (Ibid). With the shift in management philosophy from intervention to ecological integrity and efforts to re-establish fire in the national parks, the prescribed burn program has continued to expand.

The existing prescribed burn program in JNP has four main components: budgetary concerns, planning, research and fire use. Every fire in the park, whether a prescribed burn or a wildfire ignited by any source, is part of the overall program of fire management and is monitored according to management principles. Management objectives should be measurable and follow the principles of ecosystem-based management, and it is management objectives that determine whether a fire is wanted or unwanted (Parks Canada, draft 2002c, fire use planning chapter, p. 3).

JNP's budget is smaller than Banff's and must stretch to meet the needs of the park's larger area. The resources available for fire management have been affected, there simply is not enough money available to implement a fire management program like Banff's (pers. comm. D. Smith, July 18, 2002). With large numbers of tourists, increasing fuel loads, and the often contradictory requirements of wildland and urban areas the fire management challenges are tremendous.

An integral aspect to any fire management planning is the integrity and safety of Jasper townsite and the forest management areas (FMA's) located immediately outside the park border. The battle between the wildland/urban interface often locates squarely in the middle of the UAV. In some areas of the park, fires must be prevented despite the ecological benefits of potential fires. Several factors are involved. The townsite and its houses, tourists, hotels, and other businesses cannot be burned out. The prevailing westerly winds tend to funnel fire down the UAV into the townsite and out into the FMA's; park managers cannot permit this to happen. Smoke management is required as air quality is a factor for both the townsite and Highway 16 that runs through the park. The interaction of these elements creates difficulties for the implementation of fire, both for historic fire cycle maintaining fires and the establishment of fire guards for wildfire protection. Modification of fuel load and structures are an integral part of fire prevention.

Fuel modification may require fuel removal, reduction or conversion and often applies around townsites, campsites, park facilities, highways and boundary areas (Parks Canada, draft 2002c, fire prevention chapter p. 6). Breaks in the fuel load can be accomplished through natural breaks, mechanical means or prescribed burning. Structural and infrastructural modification may also be necessary, for example eliminating woodpiles and creating access for suppression vehicles (Parks Canada, draft 2002c, fire prevention chapter p. 6).

There are three types of prescribed burns in JNP: Fires for restoration, to maintain the mean fire return interval, and strategic burns. Restoration fires are designed to restore particular ecosystems, such as, prescribed fire in an area historically grassland but currently forested. Strategic burns are fires designed to reduce the risk of wildfire by reducing fuel loads in vulnerable areas, for example the townsite or FMA's. Wildfires permitted to burn are generally strategically located. Most of the prescribed burns done to date have been strategic burns (pers. comm. D. Smith, July 18, 2002). The prescribed fire program in JNP is not yet at the point of implementing prescribed burns with the specific goal of maintaining the historic fire average. The fuel build-up that has occurred over the past century, coupled with the past fire suppression policies has created a fuel load problem unparalleled in known history (pers. comm. D. Smith, July 18, 2002). With such high levels of fuel, the goal of restoring 50% of the historic average must proceed in appropriate and safe stages. Fuel load reduction requires mechanical thinning as a first step in such conditions to control prescribed burns. Only once the fuel load is reduced, can prescribed fire be employed (pers. comm. D. Smith, July 18, 2002). Knowledge of the variety of fuel types across the terrain is essential for adequate planning.

Prescribed fire plans must be developed before a burn can occur, and there is a long process involved in the approval of a prescribed burn plan. Each prescribed fire plan is different, and the variable landscape conditions require analysing each prescribed burn area independently. For example, the Syncline Ridge prescribed burn unit is 900 hectares, and located thirty kilometers north of Jasper townsite. This unit was planned in spring 1999 to provide strategic breaks in the fuel load and to protect values-at-risk in the park and adjacent outlying areas, such as the FMA's (MacDonald, Kubian, Westhaver, 1999, p. 1). Completion of the burn will allow park managers a wider range of response to unplanned fire events. The continuity of the fuel load in 1999 required management of the entire area as a fire exclusion zone, which is problematic in an historic fire landscape. "This unit will greatly increase the safety aspect of prescribed fire, both natural and management ignited, in the heavily forested Rocky River Valley. This is viewed as a significant factor that will contribute to ecosystem health and the maintenance of ecological integrity within the park" (Ibid).

The goal of this prescription is to create a fire guard around the Athabasca/Rocky river confluence and the UAV to the east. The removal of the contiguous canopy cover will increase the natural barriers and ensure that the connection to adjacent fuel is minimized. The optimum ignition season is spring and fall, April to mid-June or mid-September to late October, dependent on local conditions (Ibid, p. 4). The Syncline Ridge prescribed burn has not yet occurred.

Site preparation involves fuel manipulation, such as mechanical thinning, and closure of the area during the burn for public safety. Test fires are carried out in a number of locations in the burn unit to determine the fuel configurations. The rate of fire spread, flame length and fuel consumption observed in the test fires help to predict fire behavior and improve the safety of the operation. Post burn patrols are maintained until the fire is determined to be completely extinguished. Plans are also made in case of an escaped fire, with worst case scenarios examined and prepared (Ibid, p. 11, 12). Prescribed fires are used as an opportunity to further public education about the fire program in JNP, and the media and information outlets are informed weeks prior to the event and on burn day. An onsite interpreter provides information, a viewing area is established, and signs are established at the location after the fire to provide information (Ibid, p. 14).

JNP's prescribed fire program is an important aspect of land management in the park. The limiting factors of fuel build-up, values at risk, the urban/wildland interface, and budgetary concerns impact the ability of park managers to place fire where it is needed in the park. The national parks goal of restoring ecological integrity, attracting tourism, and maintaining the integrity of park borders are complicating factors for more a complete implementation of fire management.

The fires ignited under the prescribed fire program are referred to as "prescribed natural fire" (Parks Canada, draft 2002c, fire use planning chapter, p. 3). However, it is important to note that the optimum ignition season for JNP prescribed burns are not in the “natural” lightning seasons of July and August. Rather, the seasonality of the prescribed burns reflects the traditional spring or fall burning practices of the Aboriginal communities.

3.3. Aboriginal History in the Upper Athabasca Valley

3.3.1. The Long View of Human Activity in the UAV

The climate and vegetation cover of the Rockies' UAV has been suitable for human occupation for 12,000 years (Beaudoin, Wright and Ronaghan, 1996, p. 115). The lack of food and sparsely vegetated terrain that existed in this region in the millennia preceding 12,000 B.P., due to the effect of the late Wisconsinan glaciation, would have precluded earlier human occupation (Ibid). Due to deposits of sand and silt early Holocene sites may be buried deeply and have poor archaeological visibility (Ibid).

Artifacts have been uncovered in the UAV that are indicative of trading networks in the archaeological past. For example, sources of obsidian are unknown in the Rocky Mountains. Obsidian originates from lava flows and can be traced back to the original source through trace elements that produce a characteristic fingerprint (James, 1986, p. 91). Obsidian artifacts recovered from archaeological sites at Patricia Lake, the Pyramid Lake area, and near Jasper townsite have been sourced to two different flows in British Columbia. The Patricia Lake flakes are dated at 4000 B.P., and sourced to Mount Edziza in northern British Columbia. These flakes were found in association with artifacts that suggest cultural affiliations with both the Interior Plateau region of British Columbia to the west and middle and late prehistoric Plains assemblages to the east. The obsidian from the Pyramid Lake and townsite areas was dated at 2500 to 1800 B.P. and sourced to Anaheim Peak in central British Columbia (Ibid, p. 93). Other obsidian artifacts have been recovered just outside JNP at Entrance, dated to 9000 B.P. and sourced to Oregon (pers. comm. Dr. C Schweger, October 5, 2001). These obsidian artifacts inform on the length of human occupation in the area and are indicative of contacts between local peoples and Aboriginal communities west and south of the Rocky Mountains.

Extensive archaeological studies have not been undertaken in the UAV. Park archaeological projects and surveys and the University of Alberta-JNP archaeological field school, which ran from 1996 to 1998, have provided much of the information available. Most of the systematic archaeological research conducted in Jasper National Park has focused on the montane ecoregion in the Yellowhead Corridor between the park's east entrance and Yellowhead Pass, few archaeological investigations have been conducted in the rest of the park area. And no detailed systematic investigations have been undertaken in the alpine ecoregion. It is estimated that less than 5% of the park has been investigated archaeologically (Hudecek-Cuffe, 1998, p. 8, 9). There are approximately 525 sites in the park, 227 precontact sites and 252 historical sites (pers. comm. Rod Wallace, July 18, 2002). The precontact site excavated by the archaeological field school, located along the Snake Indian River, was threatened by erosion. The "Snake Indian river site" is believed to have been a short-term seasonal camp with multiple occupations extending back 8000 years (Hudecek-Cuffe, 1998).

Archaeological sites have been located along the Athabasca River, with an extensive and undated prehistoric campsite located around Athabasca Falls (Francis, 1994). A surface find of a projectile point at the Overlander trail head was determined to be an Alberta point type, dated between 8950 and 9400 B.P. (Ibid). The homesteads of the Jasper families are now considered heritage resources, and the homesteads of the families of Ewan and John Moberly are designated archaeological sites (Ibid). The site of Jasper House on the shores of Jasper Lake is annually monitored, and extensive excavations were conducted in the 1980's. Historic cabins, believed to be associated with the fur trade, have been excavated in the UAV (Ibid).

Other pre-contact archaeological sites have been surveyed in JNP, all of these sites are located along the Athabasca or Miette River Valleys. The dates from these sites range from 200 B.P. to 4300 B.P. (Kay, Patton and White, 1994, p. 3-16). Both the Yellowhead highway and the Canadian National Railway line were built through this valley system, however, and the impact of this development on archaeological resources is not fully known (Ibid, p. 3-15). JNP is currently updating the Archaeological Resource Description and Analysis which should be completed in the next two years. Additional archaeological projects are ongoing or in development, which will extend the knowledge of Aboriginal history in the UAV to the more distant past.

The land management practices of the Aboriginal peoples in the UAV before 1810 are unknown. The archaeological record indicates that people were in the UAV for millennia, and they, like all peoples that followed, influenced the composition of the valley. How they influenced the vegetation requires investigation, but is beyond the scope of this study. The paleoecological studies based in JNP do not reflect fine-scale plant composition, or small local fires. The methods currently used only reflect this information on a coarser, i.e. more temporally distant, level (pers. comm. Dr. C. Zutter, April 5, 2002). In combination with the still developing archaeological record, firm statements about the nature and impact of the Aboriginal occupation of the UAV prior to the nineteenth century are risky. Two statements, however, can be made with confidence: there were people in the UAV for a long time, and these peoples influenced the landscape and its ecosystems.

Little detailed ethnographic/ethnohistorical research has focused on the Aboriginal communities who lived in, used, traded and traveled in the UAV. There is almost no information about the Aboriginal history of the UAV between the distant past and the nineteenth century. What communities lived in the UAV? When did they live there? Why did they move, if they did? Did they permanently or seasonally occupy the UAV? How did they use the UAV? What impact did their land uses have? These are questions this study cannot answer. Certainly the Secwepemc were familiar with the UAV by the early nineteenth century, as were the Cree, Assiniboine and Iroquois.

3.3.2 Aboriginal History in the UAV During the Nineteenth Century

Aboriginal history in the UAV in the nineteenth century is strongly associated with the fur trade. The early nineteenth century was a time of population movement that brought new communities into the region. The movements of Cree, Assiniboine, Iroquois and other eastern groups into the region are attributed to involvement with the North-west Company and the Hudson's Bay Company which were both heavily involved with the fur trade (Ens and Potyandi, 1986, p. 30). Some of the men from these companies stayed in the west when their contracts expired and many married local women. The frequent description of local women in the historical records is intriguing, and they are the most difficult to acquire information about. The records reflect the male-dominated viewpoint of the traders and explorers. Women are often referred to as local, but their names, their connections to the land, where they lived or even how many children they had is not recorded. The mobility of Aboriginal communities across the plains and parklands in the eighteenth century was encouraged through the fur trade, and populations expanded into new areas sometimes well in advance of trading posts. Some population expansions were temporary, and only associated with the fur trade, while other groups intermarried and then settled permanently into the new area (Nicks, 1980, p. 14). The Cree were familiar with the Rocky Mountains by the early 1730's (Russell, 1991, p. 57). An Assiniboine community, the Swampy Ground Stone Indians, was associated with the foothills between McLeod and Pembina Rivers by the 1800s (Nicks, 1980, p. 13, Ens and Potyandi, 1986, p. 29). After the western treaties were concluded in the 1870's the Stoney continued to hunt and trap in the mountains and foothills, mainly in the summer months (Milton and Cheadle, 1901, p. 236). Iroquois were also residents in the area by the early 1800's, and Iroquois were reported to be hunting fur in the Smoky River area, north of the Snake Indian River, in 1803 (Nicks, 1980, p. 21). Gainer (1981), summarizes the perceived seasonal use of the park area by Shuswap (Secwepemc), Stony (Nakoda), Sarcee, Kootenay (Ktunaxa), and Cree peoples at the time of contact with Europeans (p. 14).

Jasper House was an important Hudson's Bay Company fur trading post. Established around 1813 the post served the needs of trappers from a large district, and provided them with an incentive for trappers to remain in the region (Ens and Potyandi, 1986, p. 31). The post was only occupied between October and May, with the personnel coming to the UAV from Fort Edmonton in the fall, using both horses and dogs (PAM, HBC B.94/a/2). The records of the Hudson Bay Company trading post at Jasper House from 1827-1831 record trading with Secwepemc, Iroquois, freemen[7], Assiniboine, Snake and Cree speakers (PAM, HBC B.94/a/1, HBC B.94/a/2, HBC B.94/a/3). The factor of Jasper House, Michel Klyne, heavily relied on the Iroquois and freemen traders to maintain the viability of the post[8]. It was the Iroquois and freemen traders and hunters who provided the majority of the furs and the meat animals to Jasper House (PAM, HBC B.94/a/1). "In 1827 the post master refused to trade with a group of five Assiniboine because the few goods he possessed were intended for the local freemen and Iroquois" (Ens and Potyandi, 1986, p. 36).

The identity and cohesion of the Iroquois and freemen are referred to by many scholarly and historical sources. The Iroquois men had initially come west as employees of fur companies and independent trappers or hunters, and were known as excellent voyageurs and trappers. They also adopted the use of steel traps before other Aboriginal groups in the area (Ibid, p. 37, Nicks, 1978, p. 91). The Iroquois and freemen who stayed in the west when their contracts expired had ties to the land through their wives, who were local women, and children. Their preferred area was between Lac La Biche and Jasper House (Nicks, 1978, p. 91). The Iroquois and freemen intermarried with local people, but maintained a distinct social identity. "These Iroquois and Canadian freemen inter-married with local native groups and, in large measure, adopted their way of life. They did not, however, become submerged in the local populations and tended to associate almost exclusively with one another, forming their own bands" (Ens and Potyandi, 1986, p. 37).

---

[7] Aboriginal men who had once been on contract with the North West Company or the HBC, and were now trading independently, see Nicks (1978).
[8] A factor operated and maintained a fur trading post.

The references in Thompson, Franchere and other explorers accounts to their Iroquois guides and their families indicate that people of Iroquois ancestry were knowledgeable about the UAV some time prior to 1810 (Belyea, 1994, p.129). In 1824, while traveling through the UAV Simpson referred to a band of freemen, including Findlays, who lived in the UAV (Merk, 1931, p. 31). While exploring the Rocky Mountains Hector referred to the settlement of "Iroquois freemen" that were living in the UAV by 1859 (Spry, 1963, p. 196). Unfortunately, few records exist which detail the history of the local populations of the UAV or name the eighteenth century women who married fur traders. By the mid-nineteenth century the Iroquois and the freemen were the main inhabitants of the UAV (Ens and Potyandi, 1986, p. 37 & 38).

The establishment of the Jasper House trading post stabilized the Aboriginal population in the UAV (Ibid, p. 31). How the establishment of this post affected pre-existing land use patterns is unknown. It seems likely that the decrease in traveling time to distant trading posts in Edmonton and elsewhere, would have made trapping for furs more appealing to local populations.

David Thompson traveled with an Iroquois man named Thomas who knew the area well and guided the party through the UAV. On December 3, 1810 Thompson noted that this man insisted on guiding them to an "old hut" in the UAV located approximately at the eastern part of Brule Lake (Belyea, 1994, p. 129). This "old hut" is indicative of prior knowledge and use of the area. Thompson did not make observations about Aboriginal people in the UAV. Ross Cox in 1816 described the Aboriginal inhabitants of the UAV as "Upper Crees". He also described a story told him by these people about driving animals, most likely bison, into the Rocky Mountains (Stewart and Stewart, 1957, p. 290). Hector mentioned a "half-breed Iroquois" who lived at Jasper House with Mr. Moberly (Palliser, 1860, p. 25). In 1862 Milton and Cheadle were guided through the UAV by an Assiniboine family, they note local populations of "half-breeds" and Secwepemc, they also engaged "an old Iroquois half-breed" to guide them to Tete Jaune Cache (Milton and Cheadle, 1901, p. 235, 236, 239). They describe the Secwepemc population in some detail:

> These Shushwaps of the Rocky Mountains inhabit the country in the neighbourhood of Jasper House, and as far as Tete Jaune Cache on the western slope. They are a branch of the great Shushwap nation, who dwell near the Shushwap Lake... Separated from the main body of their tribe by 300 or 400 miles of almost impenetrable forest, they hold but little communication with them. Occasionally a Rocky Mountain Shushwap makes the long and difficult journey to Kamloops on the Thompson, to seek a wife. Of those we

> met, only one had ever seen this place.... The Shushwap of Jasper House formerly numbered about thirty families, but are now reduced to as many individuals (Ibid, p. 236-7).

The Secwepemc were the smallest band of Aboriginal groups trading in the UAV during the nineteenth century. The Secwepemc traded at Jasper House, and as they were a small group their fur returns were smaller than those of the Iroquois or the freemen (PAM, HBC B.94/a/1). Nevertheless, the Jasper House factor valued their trade and annually sent someone through the Yellowhead Pass to trade with them (Ens and Potyandi, 1986, p. 33). The winter of 1828 was a difficult one for the Secwepemc in the UAV, and there are numerous accounts of families arriving at Jasper House starving, and traveling with a few furs they had traded for food (PAM, HBC B.94/a/1). The Secwepemc use of the UAV apparently increased for a short period after the 1840s. Population movements associated with the purported massacre of the Snare community by the Nakoda in the 1840s opened up the region to occupation by the Jasper band of the Secwepemc. By the 1860s, this group had lost many of its members and by the 1890s the Secwepemc disappeared from the area (Dempsey, 1998, p. 65, 67).

When anthropologist James Teit did fieldwork among the Secwepemc in 1900 he described the band of Jasper House and Tete Jaune Cache as "...mixed a great deal with the Iroquois and Cree" (Teit, 1900, p. 454). Teit describes the long history of intermarriage between the Secwepemc, Iroquois and Cree and the strong association of the UAV with this conjoined group.

> The most of these mixed people are now located in the vicinity of Jasper House, east of the Rocky Mountains: and although through long years of intermarriage (primarily with Shuswap women) the Iroquois and Cree of that region must be largely Shuswap in blood, I cannot say definitely which language or blood has the ascendancy. I am of the opinion that the largest element of their blood is Shuswap, but that Cree is probably the language most spoken... I have assigned this piece of country on the map to the Shuswap: and from the present state of our knowledge regarding these people, they are probably as much entitled to it as either the Iroquois or the Cree (Ibid, p. 455).

Nicks describes how the fur trade accounts reflect the strong associations between the freemen in the UAV and the Iroquois in the area up to the Peace River. These groups are referred to as if they were the same band (Nicks, 1980, p. 120). Nicks (1978) also describes the association between the Iroquois and the freemen in the UAV and their tendency to intermarry (p. 95).

The size of the Aboriginal communities in the UAV during the nineteenth century is not established, as population records for the UAV are sparse in both quantity and information quality. A census of the Athabasca River District population (this area included only the western Athabasca River area) in 1805 indicates 37 white men and 27 white women and children. The Aboriginal population is recorded as 55 men, 38 women and 66 children. The Aboriginal wives and children of white men were recorded as white, thus this census records an Aboriginal population of 186 people (Ens and Potyandi, 1986, p. 31). Whether this census accurately reflects the Aboriginal population is unknown, but it indicates a small population of Aboriginal people in the region. Nicks provides population figures for the freeman population in the Smoky River/Jasper House area: in 1823 there were 23 men able to hunt (no numbers for women, seniors or children) and in 1838 a total of 58 including men, women and subadults (Nicks, 1980, p. 57). Teit estimates population figures for the Rocky Mountain Secwepemc between 1825 and 1850, and these figures would have included the people who married into the community, and placed the population between 250-300. In 1900 Teit estimated the numbers of this group as about 70 (Teit, 1900, p. 465). The Saskatchewan District Indian population census of 1873, which was a huge district that included Ft. Macleod near the Saskatchewan border, also included the UAV region and is categorized according to ethnic affiliation. The number of Cree adults is recorded as 1108, Stoney 440, Shuswap 31, Halfbreed 106, and Metis 793 (Ens and Potyondi, 1986, p. 36 census data which excludes the population figures for bands not associated with the UAV, taken from NAC RG 10 Vol 3604, file 257). It is difficult to extrapolate from these numbers for the UAV with any certainty, however the records indicate there was a significant Aboriginal population in the UAV in the early 1870's.

Rylatt and Moberly in their travels through the UAV occasionally mention Aboriginal people in 1872. Moberly largely mentions non-identified "Indians", with three notable exceptions: on October 15, he describes a settlement of "Cree half-breeds"; the man in charge of Jasper House was named "Paulette" and is described as a "half-breed Iroquois", who had family that visited from the [Smoky] River area (November 12, 1872); Moberly later identified a Shuswap man (February 4, 1872). Rylatt mentions "half-breeds" in the UAV numerous times. He also related a story by one of these people about a former population of "Snare" people in the Jasper area, who were all killed by the Nakoda (1991, p. 143).

> These half breeds inform me that some years back quite a large tribe of Indians made this river and the vicinity their home; and that buffalo used to herd in the Valley we are wintering upon in vast numbers. I can well beleive[sic] this from the many bones and bleached skulls of Buffalo I saw through the Valley, and that it must have been a sheltered spot to yard in during the winter (Ibid, p. 142-3).

Other references to the "Snare" include the statement of a fur trader with the North West Company, Daniel Harmon, who married a young woman whose mother "Was of the tribe of Snare Indians, whose country lies along the Rocky Mountains" (Harmon, 1911, p. 119). Hector in 1859 refers to the "Snake" people who were massacred by the Nakoda at an unattributed year in the early nineteenth century (Spry, 1968, p. 373). The information available for the "Snare" and the "Snake" Aboriginal communities is sparse, and it seems possible that these groups may be one and the same (Brinks, unpublished report, 1986). The apparent massacre of the "Snare" by the Nakoda has not been verified by archaeological evidence. It seems likely that large quantities of human bone in archaeological sites near Jasper townsite would have been uncovered in previous surveys or during park development. Hector and Rylatt's accounts of this supposed massacre may have been influenced by popular nineteenth century myths of the war-like nature of Aboriginal people.

The historical records reflect occupation of the UAV by a number of Aboriginal communities. The Secwepemc appear in records until the 1870's but not thereafter, and there are no references to Secwepemc communities in the UAV when JNP was established, in 1907. The references to the Iroquois and Cree freemen are of particular interest because of the Iroquois-Cree background of the Aboriginal homesteaders. The Iroquois and Cree freemen and their families appear to have been a stable population in the UAV from the early nineteenth century on. The UAV region was associated with the mixed ancestry families in the popular media, as evidenced by references in the 1890s that describe the Aboriginal community as "The band of Iroquois half-breeds at Jasper House" (Edmonton Bulletin, October 9, 1893). In 1896, John Moberly, one of the Aboriginal homesteaders, is associated with this community: "They were guided most satisfactorily by John Moberly, of the Jasper House band of Iroquois half-breeds" (Edmonton Bulletin, October 26, 1896).

3.3.3 The Aboriginal Homesteaders

It is uncertain exactly when the Iroquois and Cree ancestors of the Aboriginal homesteaders were first in the UAV though it appears that the early nineteenth century is most likely. The Jasper Iroquois-Cree population was probably founded in the period of competition between the North West Company and the Hudson's Bay Company prior to 1821 (Nicks, 1978, p. 101). Father Lacombe reported around 1850 that the Iroquois dialect had survived only among the old people that founded the Jasper population (Ibid). The children of the marriage of Henry John Moberly and his wife Suzanne Cardinal were some of the people evicted from the UAV when JNP was created in 1907 (Moberly, 1980, p. 1). Suzanne Cardinal was the daughter of Marguerite Cardinal, a Cree, and Louis Kwarakwante, a Mohawk (Campbell et al, 2000).

The following Aboriginal people homesteaded in the UAV: John and Marie Moberly, Ewan and Madelaine Moberly, Isador Findlay, Adam and Fresnine Joachim, Adolphus, and William Moberly. The families were removed and partially compensated for their losses at park creation (RG 39 Vol. 265 file 39578). These families were all biologically related and adhered to the Iroquois/Freemen pattern of intermarriage within the community: John and Ewan were brothers, Marie Moberly was Adam Joachim's sister, Madelaine Moberly was the daughter of Isidore Findlay, Fresnine Joachim was the daughter of Ewan and Madelaine (Campbell et al, 2000). After leaving the park in 1910, some families went just outside the park around Entrance, and others moved to Grande Cache (Moberly, 1980, p. 2). Descendants of the Jasper families who settled around Grande Cache are now members of the Aseniwuche Winewak Nation (AWN).

The Aboriginal homesteaders built houses, fences and outbuildings, grew gardens, harvested hay and raised livestock in the UAV. Horses were essential for transportation within and out of the valley, and cattle were an important source of milk. The horses and cattle of the Aboriginal homesteaders required a grass/forb/sedge diet, although the homesteaders did not plant grasses in order to grow feed for the horses. Instead, the horse and cattle forage was provided by the natural montane grasslands. These grazing requirements created a need for large and predictable grassland areas for the Jasper families to maintain their horses and cattle, in addition to providing adequate forage for wild animals. These natural grasslands had to be managed and maintained by the Aboriginal homesteaders in order to sustain their productivity in the nineteenth century. The homesteaders had a powerful motivation to manage these grasslands. As has been demonstrated during the twentieth century, these grassland areas do not maintain themselves in the absence of disturbances.

As outlined above, the Jasper families had a history in the UAV going as far back as the early nineteenth century. In the early to mid-nineteenth century there were many people who lived in the UAV and were reliant on the fur trade posts. "There used to be many people there - this is before my time - this is on my father's time. There were many of them here, but when they closed down Jasper House, there's no more store there - they move away" (Moberly, 1980, p. 18). People traveled, gathered plants, hunted, trapped, grew gardens, cut hay and burned, interacting in many ways with the landscape long before the park was created.

The AWN recently interviewed Elders on land use in their traditional territory, in order to establish maps of the traditional territory that can stand as official documents for both industry and governmental officials. During this process, the Elders provided information about the Jasper families which speak to the social identity of the group and the importance of their traditional territory. The community had permanent structures in the region, and some families had cabins around the Snaring River (RD#1). One Elder's grandfather had a cabin on his trapline in Jasper (MM). A number of landscape features were named, for example Brule lake was called "A-lapeche" (RD#1), and there was a named place called "Asini Kasicit" in JNP. This place is a stream of water flowing out of a rock (GM). In addition, a number of Elders referred to the location of family gravesites in the UAV (MD#2, GM).

The families would hunt and gather vegetable foods in the valley (VR, MD#1). One Elder stated that herbs that grow in the mountains are more potent than herbs that grow in the lower land (IMW). These plants include wild onions, berries, wild potatoes, and tiger lilies. Tiger lily bulbs were gathered first thing in the spring when the ground was just workable, before the plants green up and were found to be very tasty (PB interview with MD). Black and red currants, saskatoons, and buffalo berries were also gathered. The berries were dried in the sun, and then made into pemmican (PB interview with MD, 2002). Wild carrots [likely water parsnip, *Sium suave*] were collected, and the roots were used in soup. These plants were dangerous to collect, as they look similar to a poisonous plant [water hemlock, *Cicuta maculata or C. bulbifera*], therefore only adults would gather wild carrots. Due to the danger involved children were not permitted to collect them (PB interview with MD, 2002).

The gardens were an important part of the homesteader's economy. They grew wheat for flour, barley for soup, and some oats for the horses (Moberly, 1980, p. 3). The Jasper families also grew potatoes, carrots, turnips and onions in their gardens (PB interview with MD, 2002). There was good forage in the UAV, with some areas more productive than others. John Moberly's homestead was near the upslope to the mountain, and had less forage than on the other side of the river. The horses were often grazed on the opposite bank of the river from John Moberly's place, and the families would drive the horses across the Athabasca River to grasslands on the other side. Hay for the horses was plentiful in the valley, and the families would cut it for winter use (PB interview with MD, 2002).

The families set up fishing nets in Talbot Lake, and both jackfish and whitefish were caught. The whitefish spawned in February in the shallow areas of Talbot Lake. There was formerly a creek between the two lakes where the fish were caught in the spring, and nets were set across the creek. The fish were then dried and would be used to provision the families for trips to Lac Ste. Anne (Moberly, 1980, p. 22). Some families hunted in the area west of Maligne lake (RD#1). The Elders emphasized that people had to be knowledgeable about wind direction for hunting as moose, in particular, have a well developed sense of smell. If a hunter approached a moose from the wrong direction, they would not be able to come close enough to kill (Moberly, 1980, p. 10). The meat was dried on racks over a low and very smoky fire (PB interview with MD).

The Jasper families traveled within the UAV and beyond. People used to travel and camp through the UAV as far as Mt. Robson. The family would go up the Athabasca River to where it joins the Miette River and continue up the Miette to Mt. Robson (VR). The resources available on the western side of the Rockies were used in early summer. Visiting was also important for the homesteaders, the families would travel to visit the Secwepemc (RM#1). Families used to go to Tete Jaune Cache for salmon and berries (MD#1). The trips to Tete Jaune Cache were made in June for salmon fishing and berry harvesting, and these resources would be dried once harvested (PB interview with MD). Some lakes, for example Jarvis Lake just outside of JNP, were sacred (MD#1).

An important factor in the requirements of the Jasper families, from a vegetation perspective, was the needs of their livestock. Upon eviction in 1910 the Moberly's, Findlay's, and Joachim's had 102 horses and 19 cows (Campbell, et al, 2000). Based upon the information in Willoughby et al (2001) an estimated 25 to 40 hectares of natural grassland per animal per year would be necessary to meet their grazing requirements (pers. comm., October 20, 2001, A.W. Bailey). At 25 hectares per animal, they would require about 3000 ha and at 40 hectares, about 4800 ha would be required. The amount of grassland required by the Jasper families during this period was substantial, and it appears that there was sufficient forage available to meet them. There are no descriptions of starving horses or problems with forage access by the homesteaders in the oral traditions of Moberly or the other descendants. As will be described shortly, the information provided by Elders attributed this supply to the use of controlled fire management in the UAV.

Moberly described how his father cut native hay west of their homestead, and would bring down the hay on horseback in the winter. He also fenced off his hay lands, to the dismay of wandering surveyors. In 1908, dominion Land Surveyor Arthur St. Cyr complained that there was no feed available for his horses as Moberly had fenced off all the hay land outside of the river for his cattle (PAA Acc.# 79.27 file 11005). The Jasper families had milk cows, and the cattle had to be fed in the winter (Moberly, 1980, p. 7). As the dismay of St. Cyr reflects, the quality and amount of grasslands in the UAV were a prime concern for local and transient populations. When the fire suppression policies came in, the Jasper families were concerned about how they would provide for the forage requirements of their livestock. "That's what began - people couldn't see how they were going to keep the stock if there is no more fire. Eventually they figure there could be something in the grass that would make them sick" (Moberly, 1980, p. 9). Fire was a crucial land management tool for the Jasper families, and the fire employed by the Jasper families was integral to the health of the ecosystem and the animals.

Moberly's statement regarding something in the grass that would make livestock sick without fire is demonstrative of the complex of knowledge, practices and beliefs of the homesteaders. There is a cumulative effect of landscape fires on the life cycles of ticks and other parasites that live in feces and are transmitted to grazing animals. Fires in spring and fall will reduce the populations of ticks and other parasites through eliminating populations at critical periods of the life cycle. Ticks can kill grazing animals and are bothersome to humans. The cumulative effect of lowering tick and parasite populations through spring and fall fires would be beneficial for the health of all grazing animals, both wild ungulates and livestock (pers. comm. W.M. Samuel, Dec.

18, 2002). The knowledge of the homesteaders regarding the interactions between fire, grasslands and animals was extensive and indicates the breadth of their traditional ecological knowledge.

3.3.4 The Exodus from Jasper National Park

In the spring of 1910, the Aboriginal homesteaders were removed from JNP by park management. The families were viewed as an impediment to park development and policy. Some of the families were partially compensated for their buildings and other "improvements" on their lands. The official correspondence over the removal indicates the amounts paid to the Moberly's, Findlay's and Joachim's for their houses, fences and outbuildings (RG 39 Vol. 265 file 39578). The Minister of the Interior stated:

> It is considered advisable, however, in order to provide for the proper protection of the game and the administration of the Park Reserve, that the Department should have full control of all lands therein and therefore the acting Superintendent of the Park was instructed to arrange for the removal of these squatters on the basis of giving them compensation for their improvements, and reasonable damage for removal (Letter April 6, 1910 RG 39 Vol 265 file 39578).

The reference to "squatters" is meaningful. "Squatter" is a English legal term, and has implications for land rights. By referring to the Aboriginal homesteaders as squatters the Minister of the Interior was commenting on a perceived lack of previous occupation of the UAV land base. There was no compensation for the forcible removal beyond the "improvements" on the homestead lands. The homesteaders were not paid "reasonable damage for removal". Six men were paid between $175 and $1670 for their "improvements" (RG 39 vol. 265 file 39578). It is notable that the one white settler in JNP (Lewis Swift) was not removed. The park came to consider that he had title to his land, which he occupied until 1935 (Gainer, 1981, p. 83). Ironically Lewis Swift was not deemed a squatter even though he had only occupied his land for a decade prior to park establishment, many years less than the ancestors of the Aboriginal homesteaders had lived in the UAV. Further, Swift received his land grant after the homesteaders had been removed. The records reflect that the Jasper families were paid solely for the loss of their buildings and fences. The families went to other nearby areas after leaving the UAV, including Entrance and Grande Cache (Moberly, 1980, p. 2).

The eviction from JNP strongly affected the families, and subsequently their descendants among the AWN. Loss associated with the forced exodus from JNP still resonates within this community, almost one hundred years after the event. The community's use of the term "exodus" to describe the removal from JNP indicates the extent to which the UAV was considered a homeland. In a cross-cultural awareness presentation, the AWN described the removal in this way: "Our ancestor's homeland was at Jasper. The people were told their guns would be locked up, and the government told them if they did not leave, the cavalry would be brought in... This time period was shortly after the Riel Rebellion in Saskatchewan and Manitoba, so the people took this threat seriously" (AWN, 2001, p. 4). Guns were essential to the Aboriginal homesteader community, and threatening to confiscate the guns would have seriously affected their livelihood.

Elders interviewed by the AWN regarding the traditional territory made collective statements on the importance of Jasper to the community. Several Elders commented on the threat to confiscate the guns of the families, this threat, however, is not found in the official government documentation of the eviction. One Elder stated that the families guns had been locked up and that is why they were forced to move and further stated: "They regretted that land so much" (MD #1). After the exodus, one Elder described how her Grandfather returned to Jasper once a year (MD #1).

The AWN were known for their traditional practices, including brain-tanned hides, dry meat and medicines (AWN, 2001, p. 4). As described above, the plants in the mountains are always more potent than lowland plants. Gathering plants in the mountains would not only provide the most nutritious and/or medicinal plants, it would also be the most efficient use of human labour. The implication of this fact on the importance of the mountains to the people that lived there, and for their wider social community beyond the mountains, have the potential to be of great significance and are beyond the purview of this study.

The importance of the Upper Athabasca Valley to the Aboriginal homesteader community is depicted in a number of ways. In the interviews with Elders, the relationship of the people to the place is described in the feelings towards the existence of ancestor's graves and cabin sites. These places provide a concrete location for memories of, and respect toward, ancestors. Placenames like that of "Asini Kasicit" are reflective of the connection between stories based in the UAV landscape and the community. The UAV was a place of hunting, trapping, fishing, and gathering.

Alliances with other communities like the Secwepemc were cemented through trading and marriage celebrations. Unlike other Aboriginal communities confined to reservations, the Aboriginal homesteaders experienced freedom of movement in the UAV. They were mobile and could travel and trade with other groups. The concern for the health of the landscape and the wildlife when the park banned fire further reflects upon the importance for the community. The Aboriginal homesteader community helped to maintain a healthy landscape, and without this influence it was believed that the land and the animals would suffer. There was a relationship, an engagement, between the people and the place. The Upper Athabasca Valley was home to the Aboriginal homesteaders in the nineteenth century and is still considered to be their homeland.

The removal of this community affected the landscape as it did the community itself. The active management of the valley lowlands for grazing, hunting, gathering and other purposes maintained a very different landscape than that seen in the UAV today. This difference will be illustrated in the photographs and maps in chapter 4. The UAV was managed by humans for a long time, and it continues to respond to human management practices.

3.4 Discussion

This chapter examined the complex ecological forces and human history in the Upper Athabasca Valley during the nineteenth century. The variety of influences on the landscape: climate, microclimate, topography, and disturbances combined to create the historic landscape. The historic landscape was also strongly affected by interaction with the human communities of the valley.

People have been a feature of the landscape for millennia. The nineteenth century, with its changes in economic options, technologies and new populations, had a variety of distinct influences. The fur trade brought new economic potential, technologies, tools and trading goods. Human populations fluctuated, and some groups grew and others diminished. Permanent habitation in the UAV was a feature in the nineteenth century. The Aboriginal occupation before 1800 has been characterized as seasonal, since no permanent villages have been located in the archaeological record. The incomplete state of archaeological research in JNP makes certainty on this point difficult, as the possibility exists that permanent villages were there but have not yet been located. However, all evidence at this point is indicative of seasonal occupation prior to the nineteenth century.

The natural (lightning) versus anthropogenic fire controversy often receives more attention than other research issues. However, the frequent low intensity fire regime found in the lower elevations of the Upper Athabasca Valley, in combination with the known use of controlled fire by the Aboriginal community, indicates that "natural" fires often involved human beings. The spring or fall-based prescribed fire program in Jasper National Park reflects anthropogenic fire patterns, and not lightning fires. Research indicates that the "natural" fire history of the Upper Athabasca Valley necessarily includes human-ignited fires.

Why was the UAV so attractive to human communities for thousands of years? There was a variety of plants and animals, fresh water, productive grasslands, ecotones, forest, shelter from the wind so prevalent in the foothills to the east, ease of travel and access to the resources to the north, south, west and east. The UAV provided access to four other river systems: the Snaring, the Maligne, the Miette and the Whirlpool. There was a route west across the mountains, the Smoky River system to the north, and the rolling foothills to the east. The UAV was an excellent location for flexibility of choices for the human populations of the time.

The physical environment on the west side of the Rockies is different from that on the east. The amount of precipitation is significantly greater on the western side, and snow packs of twenty-five feet or more are common. This kind of snowfall has an immense impact on animals: twenty-five feet of snow is simply too much snow for an herbivore to paw through. Even if it were possible, the energy the animal would expend during this process would nullify the benefit of reaching the forage beneath the snow. The shelter and resources of the UAV were attractive not only to animals, but to people as well.

The selectivity and caretaking characteristics of gathering, as described in chapter 2, are connected to the importance of the UAV to Aboriginal communities. The plants in the mountains are known to be more potent than those in the lowlands. Why gather plants with low potency when high potency plants can be gathered? The knowledge of an area where the plants are potent was important information for Aboriginal communities and this importance is demonstrated in the transmission of this knowledge to the next generations. Could high potency plants be the featured attraction of the UAV? There were so many attractive features of the Upper Athabasca

Valley landscape that attributing all of the motivation to one feature would be inaccurate.

Trading relations were a feature of Aboriginal life in the UAV. The archaeological evidence in the form of obsidian points, provides a physical link between the Aboriginal groups of the UAV and the interior of what is now British Columbia. The people of the UAV had trading networks with the peoples to the west for over eight thousand years, and this tradition was maintained until the late nineteenth century. It is a clear indication of the importance of the social connections between human communities on the western and eastern sides of the Rocky Mountains. The establishment of the fur trade in the nineteenth century was not a new experience for the Aboriginal peoples of the region: it was a continuance of long established trading practices, enacted with new peoples in new forms.

When did the Iroquois, Cree and Secwepemc become residents of the UAV? The Cree were knowledgeable of the area before the mid-1700's and the Iroquois were certainly knowledgeable by the late 1700's. The "old hut" described by Thompson's Iroquois guide in 1810 is evidence of several years of residence, as the shelter had to be there long enough to get old. The local, generally Cree, women repeatedly mentioned in the historical records speak to the lengthy occupation by Cree peoples. The historical descriptions of B.C. Interior peoples in the UAV correlates with the archaeological evidence of long-standing relations between the eastern and western sides of the mountains. As described above, there were many attractive features of the UAV for human communities, and it was the landscape that helped to maintain the ties between these human groups.

The identity of the Aboriginal communities in the nineteenth century was strongly tied to the UAV landscape. The communities intermarried and maintained landscape ties irrespective of ethnic identity. Despite the differing backgrounds, traditions and languages of the Iroquois, Cree and Secwepemc, all of the people that were regarded as the local communities lived in and maintained their ties to each other and to the UAV landscape. The depth of knowledge of the landscape and vegetation composition is clearly illustrated by the ability of the Jasper families to gather tiger lily bulbs before they are even recognizable as such. For people without such in-depth knowledge, tiger lily plants before they green up resemble little brown sticks, like the majority of plants in the spring. The complex of traditional ecological knowledge of the Aboriginal homesteaders is also illustrated through the cumulative effect of fire on parasitic populations, and the homesteaders' concept of the maintenance of landscape and animal health through regular burning.

The engagement of the Aboriginal homesteaders with the landscape was of a different kind than the engagement of the national parks. The embodiment of the UAV region as a homeland created obligations for the community to maintain the landscape. They maintained the landscape through active management: gathering plants, collecting wild hay, hunting, trapping, fishing, and controlled fires. Without that management, it was believed that the land, and the animals, would suffer. For the Aboriginal homesteaders, the community was as important to a healthy landscape as a healthy landscape was to the community.

Buell's statement on image and conduct is an important one for an examination of the human history in the Upper Athabasca Valley. Described in chapter 2, the concept of wilderness is very different from a concept of home, and creates a different manner and philosophy of interaction between people and the landscape. For the Aboriginal homesteaders the UAV was part of the community and a place where people were important in the maintenance of a healthy landscape. The establishment of a national park in the UAV changed the relationship between humans and the landscape: human use became an impediment to landscape health.

Chapter 4. Were People Important?: Understanding the Dynamics of Vegetation Change

4.1 Introduction

The vegetation composition of the Upper Athabasca Valley has been influenced by many factors: disturbance elements, climate, the historic range of variation, human occupational history, and park development. This chapter explores the dynamics of vegetation change and asks the question: were the actions and choices of people important in the history of vegetation composition? The path to understanding this question is convoluted and seldom traveled.. The historic descriptions of the UAV landscape, the Bridgland repeat photography project, oral histories about the Aboriginal homesteader community, fire history research studies, and maps of landscape patterns are the tools used to answer the questions about the role of people in the UAV.

A detailed picture of the historic vegetation in the Upper Athabasca valley is revealed through the observations of the vegetation composition in the nineteenth century, as described by explorers, traders, surveyors and local Aboriginal people. The 1915 M.P. Bridgland photographic survey of the central area of Jasper National Park is a visual record of the UAV five years after the Aboriginal homesteaders were removed and twenty-six years after the last major fire in 1889. This survey, along with a repeat photography project completed in 1999, depict the landscape of the UAV and the contrast between the current appearance of the landscape and the appearance at the beginning of the twentieth century.

The fire history of the UAV, as deduced from interviews with Aboriginal people who lived in or are descendants of the Jasper homesteader community, the historically observed fires and the fire history research studies provide information on the history of fire in the landscape. The Aboriginal fire records detail the control mechanisms, seasonality of fire use, specific fire locations, and the continuity of the transmission of fire knowledge and technology today. The fire history research studies describe the understanding of the patterns that historic fires have left on the landscape of the UAV, and are based on dendrochronological and palynological data. The maps produced for this chapter are based on the information about the vegetation composition and fire history of the UAV between 1810 and the 1890's, garnered from the historical, interview and scientific records examined. The maps are visual tools that illustrate the patterns on the landscape that can be deciphered from these disparate sources. The analysis of the vegetation composition of the UAV will develop an understanding of the role of people in the UAV landscape, and answer the question: were people important?

4.2 Vegetation Composition of the UAV

The expeditions of surveyors, traders and explorers in the UAV record, to varying degrees, the vegetation composition they encountered. These expeditions cover the years 1810-1811, 1814, 1816,1824, 1827-1831, 1859, 1863 and 1872. These records must be carefully interpreted as a number of factors influence their reliability. The reliability factors have been detailed in chapter 1.

In the winter of 1810 David Thompson journeyed from the Saskatchewan River to the Athabasca River and through Athabasca Pass on his way to the Columbia River. Thompson spent more time in the UAV than most of the other explorers or traders, he was in the UAV from November 30,1810 to January 8, 1811. During that time he camped for over two weeks in one spot, near Brule Lake. Thompson and party traveled by dog sled, and had an Iroquois guide through the UAV (Belyea, 1994, p. 117). The variability of the landscape is reflected in his comments, particularly the difference between the more densely forested areas at the north end of the UAV, and the more open areas around Jasper Lake. On November 22, 1810 [just outside of JNP] on the banks of a branch of the Athabasca River Thompson notes: "We held on ... to the place of our campment, a small Plain of good grass" (Ibid, p. 124). While traveling through the high elevations above the Athabasca River, outside the boundaries of what would become Jasper National Park, Thompson notes on November 29: "Always high lands & Thick woods of Pine & Cypress, mostly the former, but green. The Country appears very rude & marshy, mossy & very uneven - no appearance of Animals or Plains" (Ibid, p. 127). On December 3 traveling on the west side of the Athabasca River past Lake Brule Thompson's Iroquois guide recommended the company camp at an old hut on the lake: "The Hut is small & very dirty, besides being without Windows, badly situated & no Grass for the horses" (Ibid, p. 129). The following day they travelled into a different landscape: "Camped near a small Fountain of Water among Pines and Aspins [sic], with plenty of Grass for the Horses" (Ibid). Thompson makes a more complete observation of the vegetation in the region on January 4, 1811 traveling up the UAV towards the Maligne River:

> The Country from our entrance into the Mountains hereto has been tolerable good for such northerly mountainous Lands: there are very many low rocky Hills, with plenty of wild Sheep but saw no Goats, & the many Defiles in the Mountains & Brooks with the Islds[sic] &c afford room & rude pasturage for a few Buffalo, Red Deer & a chance Moose. The Woods are always low branchy Pines almost unfit for any Thing.... No Juniper, a little Poplar & many Willows & Alder (Ibid, p. 134).

Thompson was nearing the confluence of the Whirlpool and Athabasca Rivers on January 6, and observes: "The River & Country has a rude barren appearance & seemingly no Grass for large animals - where we put up there are a few small Ponds & Marshes that bear long grass. Here a herd of buffalo had been lately feeding..." (Ibid, p. 135).

Thompson described a forested landscape in the higher elevations of the UAV, and a more variable landscape in the lower elevations. The vegetation described for the lower elevations was both trees and herbaceous plants: patches of grassland, pines, a small amount of poplar, a great deal of willow and alder. This variation in plant composition is strongly associated with a frequent fire regime: all of the plants are fire adapted and reflect different stages of regrowth after a fire. Thompson recorded some of the animals killed by the hunters with the exploration party: during the month spent in the UAV the hunters killed twelve bison, four big horn sheep and one elk.

Gabriel Franchere passed through the UAV May 16-25, 1814 using both canoes and horses. Franchere's guide was Iroquois (Lamb, 1969, p. 162). It appears to have been a late spring that year as Franchere referenced five feet of snow in the area of the Whirlpool-Athabasca River confluence (Ibid, p. 160). Franchere describes the area around Prairie de la Vache: "Went on our way through more attractive country than on previous days, occasionally coming upon buffalo carcasses, and camped on the edge of a prairie that our guide told us was called Cow Prairie" (Ibid). The next day on the way to Henry House Franchere notes passing through a "little aspen wood" and the setting of Henry House: "The site of this house was pastoral in the extreme; it was built on the river bank, surrounded by groves of trees and lush meadows" (Ibid, p. 161). Over the next two days Franchere and party traveled down the Athabasca River to Jasper House, then located on the edge of Brule Lake. He describes Jasper House, called Rocky Mountain House: "Rocky Mountain House is situated at the edge of a small lake in the middle of a wood and is surround by cliffs frequented only by ibexes [mountain goats] and sheep" (Ibid, p. 163).

Ross Cox traveled through the UAV during the first week of June in the summer of 1816. He made a number of comments about the vegetation of the UAV while he traveled up the Athabasca River and along the valley. Cox's guide was also Iroquois (Stewart and Stewart, 1951, p. 284). On June 3 Cox notes:

> From the junction of the two rivers [Athabasca River and Whirlpool River] to the Old Fort [Henry House], the country on each side [of the Athabasca River] presents a pleasing variety of prairies, open woods, and gently rising eminences; one spot in particular, called *La prairie de la Vache* (in consequence of buffalo having been formerly killed in it), forms a landscape, that for rural beauty cannot be excelled in any country (Ibid, p. 287, italics in text).

On June 5, 1816 while traveling along the river bank trails between the locations of Henry House and Jasper House, Cox states: "And as it [sun] rose above the lofty summits, imparted a golden tinge to the green savannahs, open woods and innumerable rivulets which contributed their waters to swell the Athabasca. It was indeed a landscape of contrarieties..." (Ibid, p. 288). He noted that the landscape was much the same in the vicinity of Roche Miette (Ibid, p. 289). In contrast, as the trip continued up the Athabasca toward the Pembina River, Cox describes the landscape as: "The country on each side of the river is low, and tolerably well wooded..." (Ibid, p. 292).

George Simpson traveled through the UAV from October 10 to 17, 1824. In addition to his narrative, Simpson described how the trading companies attempted to draw Aboriginal hunters-trappers into particular regions to benefit the company fur returns (Merk, 1931, p. 30). His vegetation observations are infrequent. He notes at Jasper House, now located on the banks of Jasper Lake: "The situation of Jasper House is beautifully Wild & romantic, on the borders of the Athabasca River which here spreads itself out into a small Lake surrounded by Lofty Mountains" (Ibid). On his trip from Henry House up the Miette River valley Simpson describes: "Our road was rugged and bad frequently covered with fallen Timber the country having been over run by Fire; it appears well stocked with Animals as we found many tracks of Buffalo & Deer; the Mountain Goat and Sheep are likewise numerous..." (Ibid, p. 32). Simpson's expedition of October 1824 was the last one to record evidence of buffalo in the UAV.

David Douglas traveled through the UAV May 3 and 4, 1827. He traveled up the Athabasca River from the confluence with the Whirlpool River. His only landscape description notes: "Intended to put up at the usual camp, but finding the horses and land better than expectation, they proceeded to the end of the portage on horses... A little above the camp [Henry House] is a small lake a mile and a half broad, with a beautiful plain on each side." (Douglas, 1959, p. 261). The rest of the trip up the Athabasca River in the UAV was by canoe and the vegetation was not well described.

Factor Michel Klyne, who was in charge of the trading post, at Jasper House was primarily concerned with recording the amount of furs being traded with the different Aboriginal groups in the area. His observations about vegetation can be deduced from the comments about the conditions of the horses grazing in the grasslands of the UAV. In early November 1827 he observes that the trading posts mares and horses grazing in the UAV were in good shape. Klyne states later in the journal that the horses were kept half a day away, i.e. a full day's travel to and fro, from the post (PAM, HBC B. 94/a/1). In October 1829 Klyne notes that four of the posts' horses were sent to an Iroquois man at Smoky River for winter grazing. At the end of November the rest of the horses that were wintering in the UAV had sufficient forage to have gained weight and maintained it: "I sent for the mares arrived the [sic] are very fat" (PAM, HBC B. 94/a/2). In February of 1830 the vagaries of weather and the effect on grazing animals was noted: "And to [sic] much of snow to make use of horses he told me also that et [sic] is not long when he saw the Horses last he change them places some of them are getting poor the planes [sic] are all cover with ice he found two horses dead..." (Ibid). The winter of 1830 was a harsh one, in March Klyne notes that the Iroquois man who had wintered a few of the Posts' horses with his own at Smoky River had lost twenty-two horses on account of the thick snow and ice covering the plains (Ibid). The February of 1831 however, found the Posts' horses who had wintered in grasslands of the UAV to be in excellent condition: "They arrived with the mares I found them very fat I sent them to the fishing Lake" (PAM, HBC B.94/a/3). This observation indicated the wealth of available forage for the horses in the grasslands of the UAV, given a lack of a hard crust of ice.

It is likely that a winter thaw and subsequent freeze caused a thick layer of ice to lie overtop of the vegetation during the winter of 1830. The ice crust would severely impact the ability of grazing animals to access forage (pers. comm. Dr. B. Irving, Nov. 4, 2002). It is a well-established principle of range management that native ungulates are limited by the quantity and quality of forage on winter ranges (Noss and Cooperrider, 1994, p. 226). As the post was not growing feed for the horses this principle would apply. Late winter is often an exceptionally difficult time for grazing animals: the weather is cold, the easily accessed forage has already been grazed, and animals often end up consuming whatever vegetation is available regardless of quality. Sometimes grazing animals even eat soil during winter forage shortages to meet their requirements for minerals like phosphorus (Holechek et al., 1998, p. 313). Horses are primarily grazers, and seek habitats that produce large amounts of herbaceous forage (Irving, 2001, p. 46). "During periods when range forage quality and availability are high, grazing animals have high intakes of crude protein and energy. During these periods, high rates of weight gain occur" (Holechek et al., 1998, p. 313). Fat horses in February indicate a considerable, and consistent, amount of available forage.

In January and February 1859 Dr. James Hector of the Palliser expedition traveled to Jasper House from Ft. Assiniboine. As it was mid-winter he made no observations of the vegetation composition of the valley (Palliser, 1860, p.25).

In June 1863, Viscount Milton and Dr. Cheadle traveled from Edmonton by way of the Pembina and McLeod Rivers to the UAV. Milton and Cheadle spent two weeks in the UAV, from June 27 to July 9. Traveling by the trails along the valley in late June they note in the vicinity of Roche Miette: "Following the river-valley, we traveled through thick timber, marshes, and boggy ground, pleasantly varied occasionally by beautiful park-like oases of an acre or two in extent.... In the evening we encamped on a tiny prairie, rich with vetches in full bloom" (Milton and Cheadle, 1901, p. 224). Milton and Cheadle record a still smoldering landscape fire on June 27, 1863 on a north-facing slope near Roche Miette: "The trail began to ascend the river bank, and we presently encountered a thick smoke. A little further we found the path completely obstructed by fallen trees, and obliterated by the effects of a fire that was still smouldering[sic]" (Ibid, p. 226). On June 29, opposite Jasper House, the vegetation is described:

> Jasper House is a neat white building, surrounded by a low palisade, standing in a perfect garden of wild flowers, which form a rich sheet of varied and brilliant colours, backed by dark green pines which clustered thickly round the bases of the hills. Above, a zone of light green shrubs and herbage still retained their vernal freshness, and contrasted with the more somber trees below.... In the neighbourhood of Jasper House the flowers were very beautiful and various (Ibid, p. 228).

On July 4 just above the Maligne River junction with the Athabasca River the party crossed the Athabasca to the vicinity of Henry House.

> We landed on a sparsely timbered flat, where the trees had all been destroyed by fire, packed the horses, and traveled a few miles before sundown. By noon

> on the following day, and still following the Athabasca, we reached a beautiful little prairie, surrounded by fine hills green almost to their summits... the prairie was richly carpeted with flowers, and a rugged excrescence upon it marked the site of the old Rocky Mountain Fort, Henry's House (Ibid, p. 241).

In 1872 Walter Moberly conducted a preliminary survey for the Canadian Pacific Railway. Moberly records the vegetation composition of the UAV. Extensive grasslands and good traveling from Henry House to Moose Lake were recorded. The junction of the Miette and Athabasca Rivers was described September 12 as open lands with some prairie and good feed.

> Then crossed two small streams with good feed & some small prairies & than over an open, rolling, burnt & grassy flat of about 2 miles in extent which brought us to a long point that projects between the Athabasca River and a lagoon on its left bank. this being a beautiful camping ground and plenty of good grass I camped here (Moberly, 1872).

Later that month, September 22, in the Prairie de la Vache region Moberly notes:

> Crossed creek where there is some good feed on hill sides which are open then came on very pretty prairie with beautiful stream running through it, the prairie is covered with the best feed I have yet seen & a good deal of Wild Peavine. The trail from camp to this prairie was good & generally through open Black pines... (Ibid).

On December 11 Moberly states: "I crossed Lac a Brule on the ice to its North Westerly shore where Indians informed me I should find a very good place to winter my animals, good grass on mountain side wh. is not timbered & where the snow always blows off, good grass on flat bordering lake..." (Ibid). Moberly wintered the horses in 1872 about 3 to 4 miles below the Snake Indian River, December 11: "Where there is an extensive range of good grass on flats and side hills which is watered by several streams 2 of wh. [sic] do not freeze and plenty of shelter in the thick timber which exists in several places in the [surrounding] [country]" (Ibid).

The time of year that the explorers were in the UAV varied, and the cumulative observations cover most of the year. The ability of these parties to observe vegetation composition was framed by the timing of their travel through the UAV and the specific conditions experienced by the party. These conditions are important to note, for at times of heavy snow cover the ability of the parties to note the vegetation is circumscribed. Anyone who has traveled through a landscape in both winter and summer will have noted different aspects of vegetation, this is particularly true when traveling through an area that is unfamiliar. The unfamiliarity with the landscape speaks to the importance of guides, guides who would know good places to camp, dangerous areas to avoid, and a multitude of other factors without which the expedition would face serious difficulties. As mentioned above Thompson made his observations in the UAV in winter, as did James Hector. Ross Cox provides information about early June. The Jasper House journals provide records for October to April. Milton and Cheadle were in the area in late June and July, and Moberly in September, October and December. There are few observations that cover May except for Franchere in early May 1814 and Douglas in 1827, which will be discussed later in the fire history section. All of these parties (except for Hector who recorded nothing about vegetation composition) are in agreement about the presence of grasslands around Jasper House, Henry House and Prairie de la Vache. Numerous observations are also made about open woods and small grasslands all along the UAV.

The documentation of the disappearance of buffalo in the UAV between 1824 and 1827 is significant. Thompson, Cox and Simpson observed buffalo in the valley, and buffalo was the favorite meat animal for Thompson's expedition party. Thompson's party killed at least one dozen buffalo during the month they spent in the UAV, and there may have been more killed than were recorded. The other explorers do not record the number of buffalo they hunted, but buffalo would have been a primary goal of the hunters for the party. Buffalo are a large animal with a good flavour and these factors made buffalo a favourite with human hunters. There were no buffalo recorded in the UAV by the time of the Jasper House journals, 1827-1831, or in any subsequent record. Due to the desire for buffalo by hunters, if there had been any in the UAV their presence would have been recorded. The decade and a half between the historical records which describe good-sized populations of buffalo in the valley in the 1810's and the disappearance of the buffalo by 1827 is suggestive of heavy hunting pressure from explorers and traders. The explorers and traders often had insufficient provisions for survival and relied on hunting in whichever area they were traveling through. For example, the Jasper House Factor and the party that maintained Jasper House did not leave Fort Edmonton with sufficient provisions. This is possibly why there are complaints of scarce animal resources. The HBC at Jasper House did not leave a hunter in the region over the summer to hunt and store meat provisions. The sudden increase of large numbers of people into the region in the winter who relied almost exclusively on animal foods must have had a detrimental impact on animal populations.

The historical records provide a narrative of the vegetation composition in the UAV during the nineteenth century. In the following section the topographic survey photographs of Bridgland and Rhemtulla and Higgs provide a visual depiction of the vegetation composition of the UAV during the twentieth century. Bridgland's photographs illustrate the appearance of the landscape five years after the Aboriginal homesteaders were removed in 1910 and twenty-six years after the last major fire in 1889.

4.3 Repeat Photograph Pairs

The survey and subsequent mapping of the Rocky Mountains was a primary governmental objective in the late nineteenth and early twentieth centuries. Maps were needed to establish the development of forest, farming and mining resources (Thomson, 1966, p. 131). The economic considerations of the young Canada, so aptly described in the annual reports of the national parks cited in chapter 2, demanded an assessment of the extent and location of the country's natural resources. The topography of the mountains posed challenges not experienced on the flat prairies: rugged terrain, a short survey season, and unstable and often severe weather conditions (Ibid). The Surveyor General of Canada, Edouard Deville, was instrumental in the development of photographic survey methods and equipment to meet the needs of surveying in the rough and demanding terrain of the Rocky Mountains (Ibid, p. 132).

In June 1915 M.P. Bridgland, a Dominion land surveyor, was instructed to complete a phototopographical survey of the central part of Jasper National Park. Bridgland and his party climbed mountains, crossed rivers, traversed grasslands and took photographs of the landscape. Several photographs were taken from each survey station to depict and map the terrain. From these photographs Bridgland worked to create the first topographic map of the central part of JNP.

A total of 93 survey stations were occupied, 750 photographs of the 1915 landscape were taken from mountain tops, cliffs and prominent ground locations. A complete photographic record of the entire horizon from each station was made (Rhemtulla, 1999, p. 17). Some stations had to be occupied more than once due to adverse weather conditions that obscured a clear view. The 1915 survey of JNP was a difficult one, the weather was not favourable for much of the season and the valley was wide and made photography difficult (RG 88 Vol. 353 file 15756). Yet Bridgland prevailed and we now have this incredible set of photographs that depict the 1915 landscape of Jasper National Park.

In 1998 and continuing in 1999, armed with the recent discovery of the 1915 photographs, Rhemtulla and Higgs returned to the survey stations and began the rephotography process. Rhemtulla and Higgs re-occupied all 93 of the survey stations and repeated all 735 photographic images. The photograph pairs, those of the 1915 M.P. Bridgland topographic survey and the project of Rhemtulla and Higgs, show the landscape of the central part of Jasper National Park, including most of the areas described in the nineteenth century travel accounts, at the beginning and end of the twentieth century.

The 1915 photographs were selected to show the UAV from the north to the south end. The first station depicted is at the north-eastern end of JNP, Roche Miette, the last station depicted, Mt. Tekarra, is at the southern end of JNP near the Whirlpool River (see location map in chapter 1 for photographic station locations). The methodology used to analyse the photographs was a qualitative one. Digital photographs were visually examined using Adobe Photoshop for areas of grassland and forest. These areas were then enlarged through the zoom capacity up to 100% to more closely examine the vegetation composition. The relative amount of these vegetation types was compared for each pair of the 1915 and 1990's photographs. Pairs from the following stations were selected: Roche Miette, Roche a Bosche, Mt. Greenock, Morro Peak, Henry House, The Palisade, Roche Bonhomme, Mt. Henry and Mt. Tekarra. Narrative descriptions of the vegetation composition are located after each pair of photographs.

Plate 4 – 1 Photograph #672, Roche Miette I

The view of this photograph is south-east, with Jasper Lake in the centre of the photo. On the east side of Jasper Lake at the foot of the slope open forest with patches of grassland are visible. This photograph depicts a variable landscape; some dense forest and open forest, along with shrubs and grassland. On the west side of Jasper Lake there is an extensive grassland flat with a mix of grassland and shrub upslope. The steeper slope area is more densely forested. Near the bottom left side of the photograph there is a densely forested area around Rocky River draining into Jasper Lake. At the bottom left an area at the foot of the slope on the flats where a distinct demarcation of grassland and forest is visible, with some shrubs in the grassland area. There is a distinction between the vegetation composition of the low and high elevations. The vegetation tends to be variable in the lower elevations, grassland and shrubs on the flats and extending upslope on both north and south-facing slopes. The higher elevations tend to be more forested. On the west side of Jasper Lake extensive forest encroachment is visible on the 1990's photograph. Forest encroachment is also seen on the left side of the photograph at the foot of the slope. Little elevational variation is depicted in the repeat photograph.

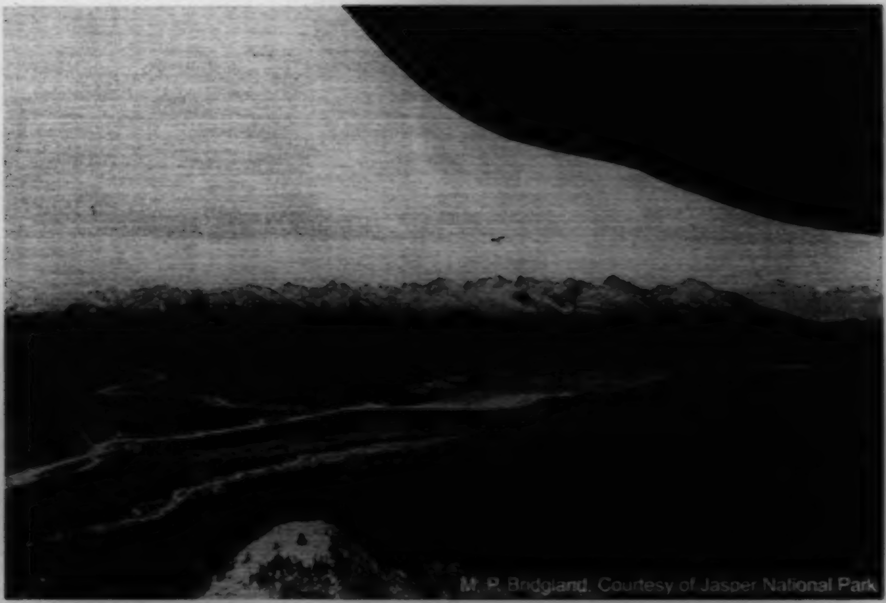
Plate 4-1a Roche Miette Bridgland Photograph

J. M. Rhemtulla and E. S. Higgs © University of Alberta

Plate 4-1b Roche Miette Repeat Photograph

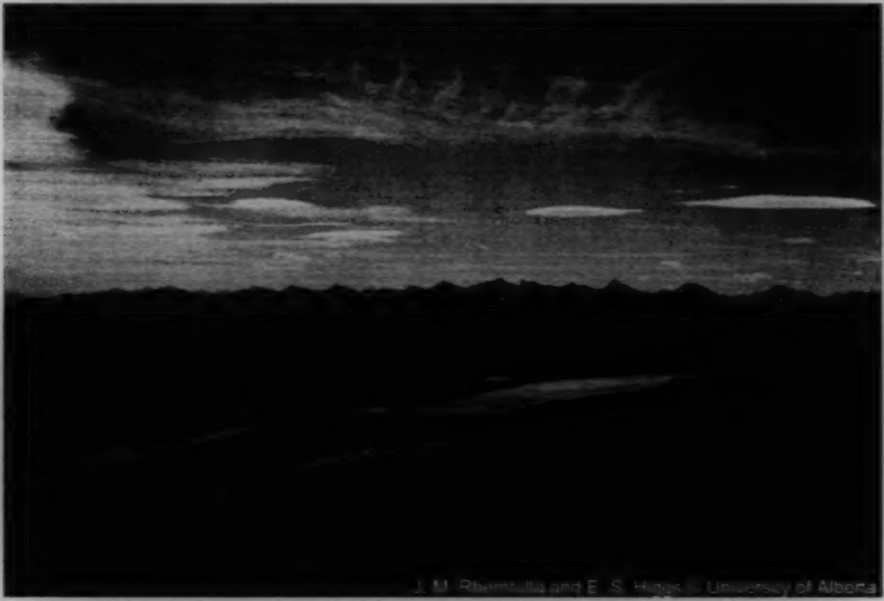
Plate 4 – 2 Photograph #568 Station Roche a Bosche

The view of the photographs is south, with Jasper Lake in the centre-right, the photographs were taken from the west side of the Athabasca River and across from Roche Miette. On the west side of the lake there are extensive grasslands on a rolling landscape with pockets of open forest in the lower elevation areas. There is denser forest on the steep, north-facing slope at the bottom right of the photograph. On the left side of the photograph forest at the mouth of the river draining into Jasper Lake is depicted, while in the remaining lower elevation areas and heading up the slope are grassland. On the east side of the lake above the wetlands extensive grassland areas, with small pockets of forest, are located on the south facing slopes. There are fringes of forest along the riverbank. Some of the islands in the Athabasca River are forested. There is contrast between the vegetation cover of the low and higher elevations. Grass, shrubland and variable forest at the lower elevations and open to closed forest cover in upper elevations. Forest encroachment on grasslands on the west side of the lake is evident in the repeat photograph. The left side of the photograph illustrates forest encroachment on the hill slope. An increase in forest density is reflected on the east side of the lake. There is little variation between the low and high elevations in the repeat photograph.



M. P. Bridgland, Courtesy of Jasper National Park

Plate 4 – 2a Roche a Bosche Bridgland Photograph

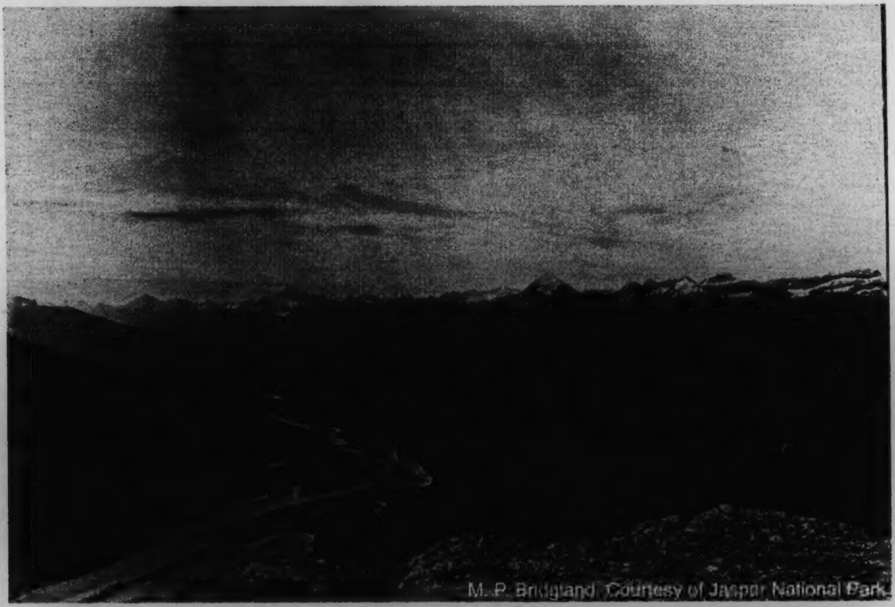


J. M. Rhemtulla and E. S. Higgs © University of Alberta

Plate 4 – 2b Roche a Bosche Repeat Photograph

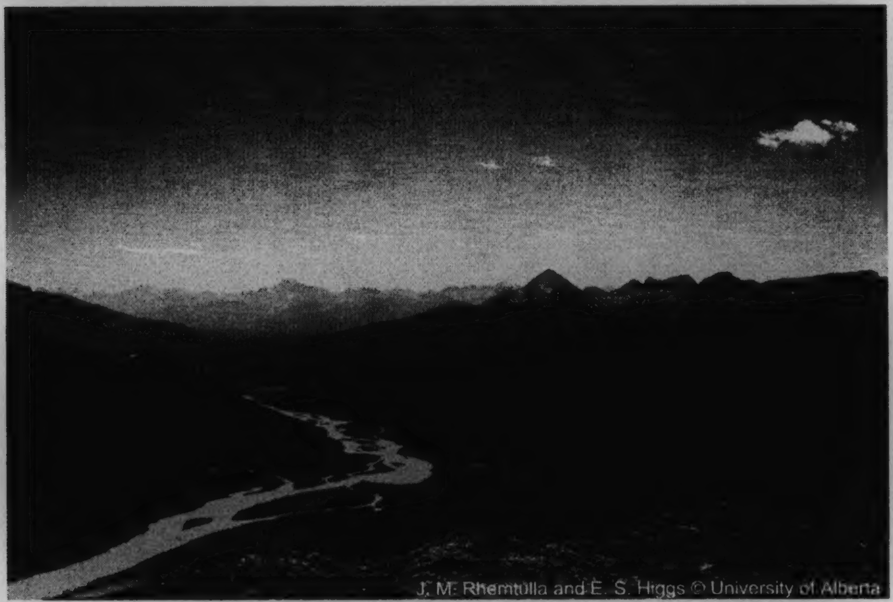
Plate 4 – 3 Photograph # 508 Station Mt. Greenock

The photograph direction is south, taken from the west side of the Athabasca River. In the 1915 photograph on the lower left side located at the south end of Jasper Lake the vegetation is a mixture of grassland and shrubs on the flats with open forest increasing upslope. Forest cover is extensive in the central background and upslope on the west side of the river. A variable landscape of grassland and patches of trees are visible along the riverbank. The contrast between the north-facing and south-facing slopes is visible, more grass and shrubland on the south-facing slopes. The wetland complex is extensive in 1915 with many river channels. In the repeat photograph some increase in forest density is visible on the lower left portion of the photo at the south end of Jasper Lake. Extensive forest encroachment on grassland is visible along the west side of the river and up the slope. A few small remnant grasslands remain in the 1990's photograph. There is little variation in vegetation cover between the low and high elevations in the repeat photograph. Watercourse changes are evident to the wetland, as well as fewer river channels.



M. P. Bridgland, Courtesy of Jasper National Park

Plate 4 – 3a Mt. Greenock Bridgland Photograph

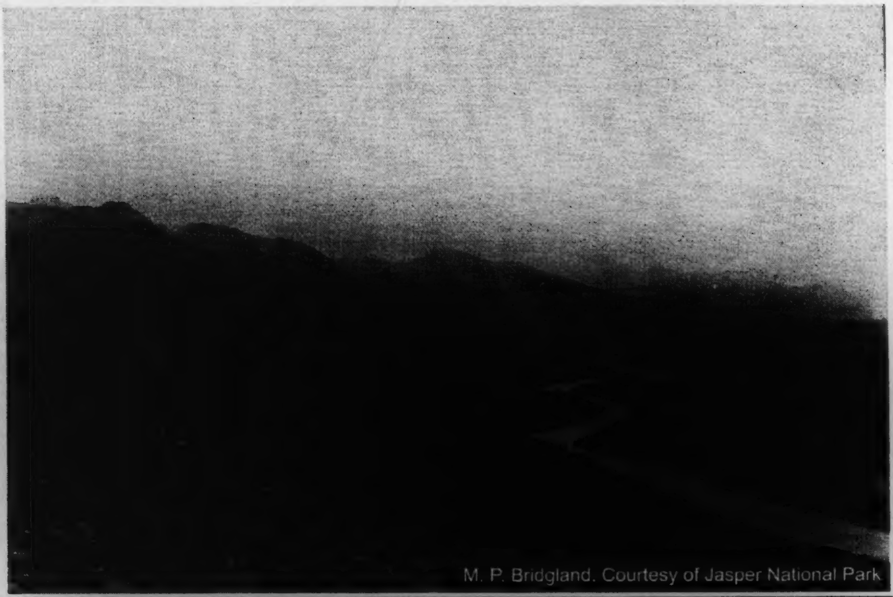


J. M. Rhemtulla and E. S. Higgs © University of Alberta

Plate 4 – 3b Mt. Greenock Repeat Photograph

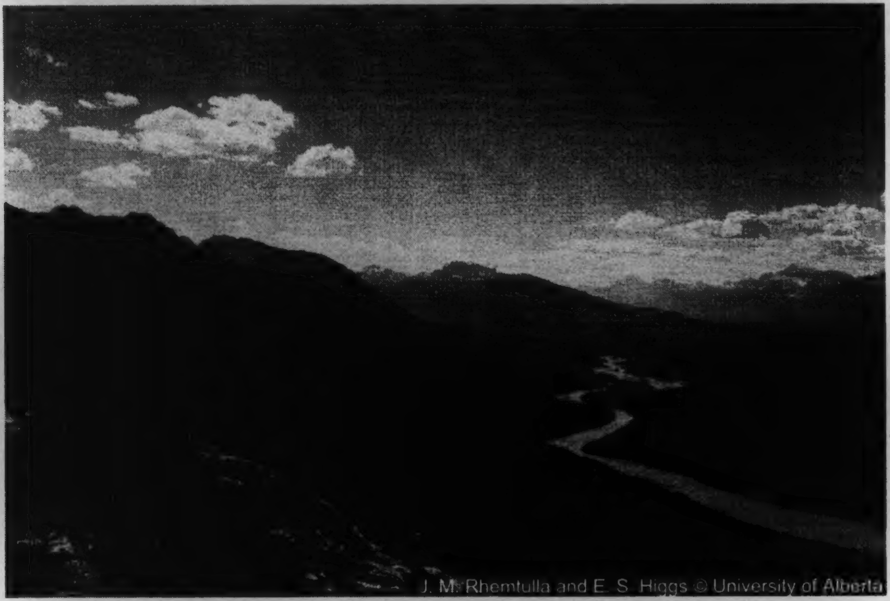
Plate 4 – 4 Photograph #308 Station Morro Peak

The photograph direction is south, taken from the east side of the Athabasca River. In the 1915 photograph extensive grasslands on the west side of the river, at Henry House, are visible along with scattered shrubs and pockets of open forest. On the east side of the river going up the slope a variable landscape of grassland, shrubland and open forest is depicted. Patches of burnt trees are visible up the slope. In the background of the photograph grasslands are located on the flats and heading up slope along with scattered patches of forest. There is a fringe of forest along both sides of the Athabasca River. There is more forest cover in the higher elevations. Both north and south-facing slopes have a variable cover of grass and shrubland. The central portion of the grassland at Henry House remains in the 1990's with forest encroachment along the grassland areas. Forest encroachment on the eastern side of the river and the slope is evident, except for the central-left portion of the slope that was part of a 1989 prescribed burn.



M. P. Bridgland. Courtesy of Jasper National Park

Plate 4 – 4a Morro Peak Bridgland Photograph

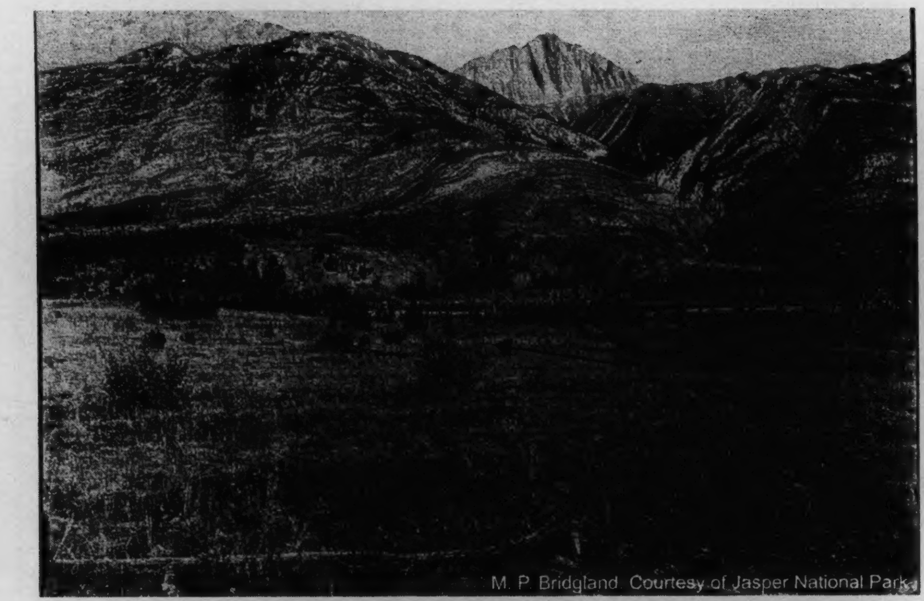


J. M. Rhemtulla and E. S. Higgs © University of Alberta

Plate 4 – 4b Morro Peak Repeat Photograph

Plate 4 – 5 Photograph #467 Station Henry House

The view of the photograph is east, taken from the west side of the Athabasca River. This area is also shown in the photograph from Morro Peak. In 1915 the grassland in the foreground is comprised of grasses, forbs, shrubs with scattered small patches of young trees along the river bank. On the east side of the river a variable landscape of grassland patches, deciduous trees (aspen), and small patches of conifers up the slopes of the mountains are depicted. The vegetation cover is variable in both low and high elevations. The trees in the 1990's are larger and encroaching on the grassland, the 1915 shrublands are no longer visible. Extensive forest encroachment on the grassland on the east side of the river is depicted at both low and high elevations.



M. P. Bridgland Courtesy of Jasper National Park

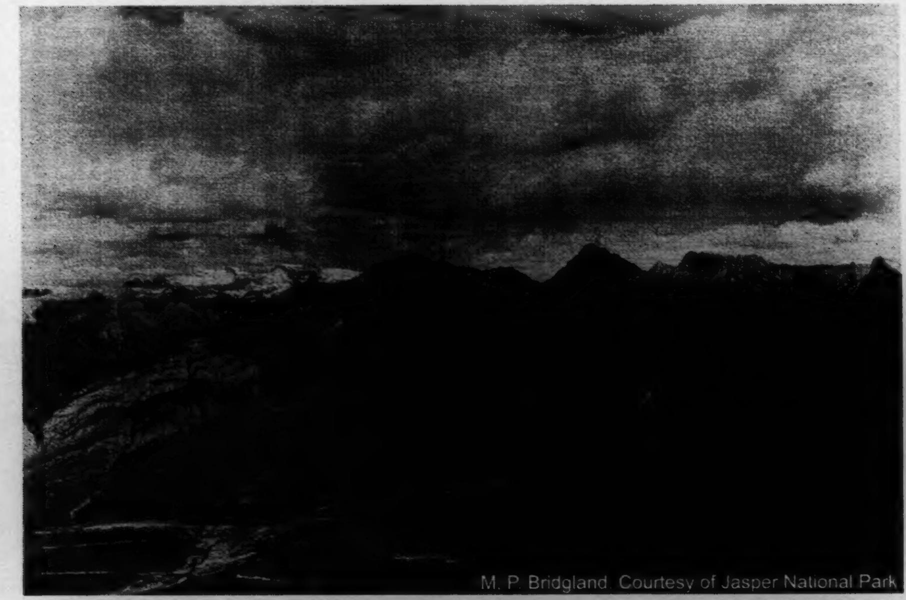
Plate 4 – 5a Henry House Bridgland Photograph

J. M. Rhemtulla and E. S. Higgs © University of Alberta

Plate 4 – 5b Henry House Repeat Photograph

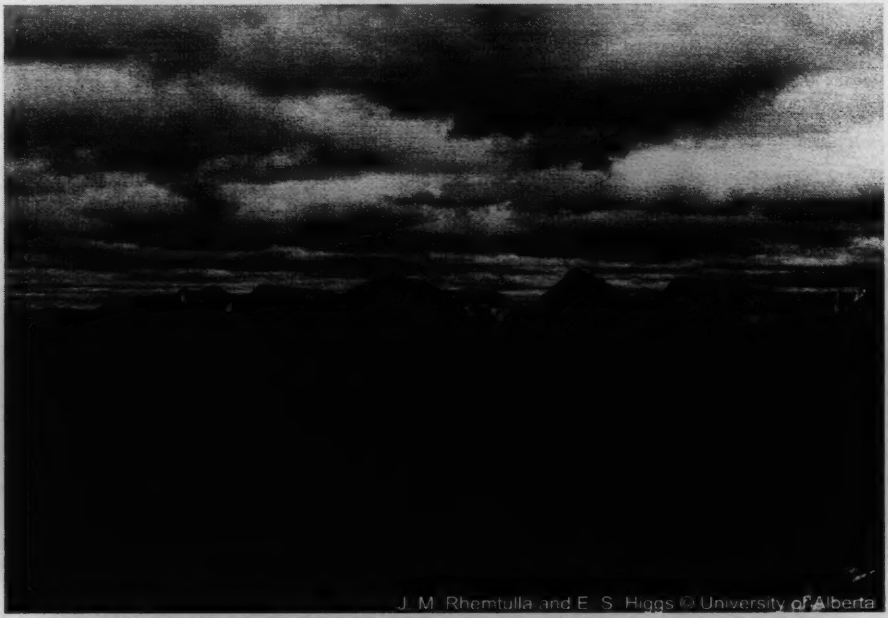
Plate 4 – 6 Photograph #471 Station The Palisade

The view of the photograph is east, taken on the west side of the Athabasca River. On the right side of the 1915 photograph there is a small area on the east side of the Athabasca River on the river flats that at 50% zoom the homestead of one of the Jasper families (John Moberly's) is visible. One large and one smaller building can be seen with a clearing that appears to be grassland on the flat and extending up the slope. Shrublands and patches of trees are more frequent upslope. Trees are visible on both sides of the riverbank, along the water. In the foreground on the west side of the river the variable landscape of large patches of grassland and patches of forest are largely obscured by the shadow cast by cloud cover. The lower elevations have a variable vegetation cover, a complex of grass, shrubs and trees. On the left side of the photograph the grassland area extends upslope. The Athabasca River has more channels in 1915. In the repeat photograph forest encroachment on grassland is evident at the foot of the Colin Range. Overall forest density has increased regardless of slope aspect or elevation. Some changes in the watercourse are also evident.



M. P. Bridgland Courtesy of Jasper National Park

Plate 4 – 6a The Palisade Bridgland Photograph

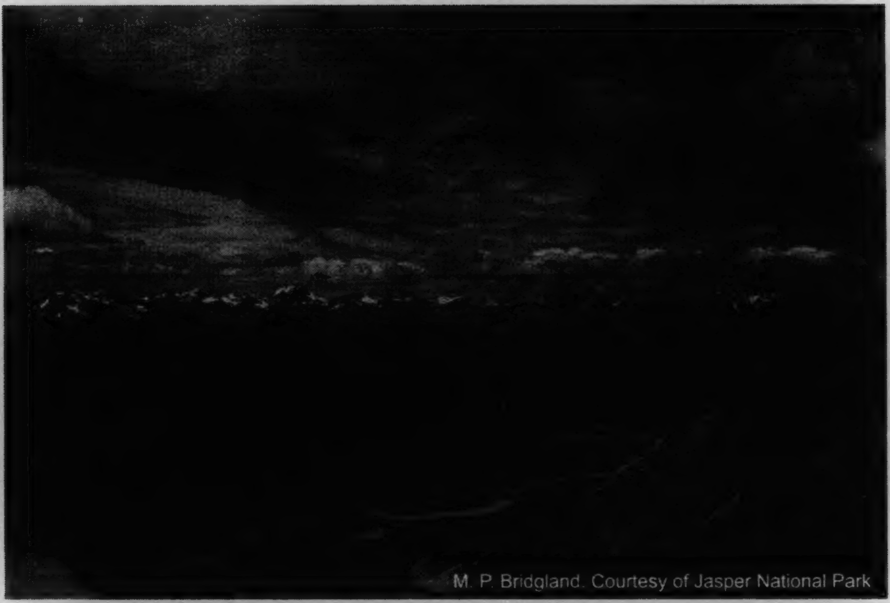


J. M. Rhemtulla and E. S. Higgs © University of Alberta

Plate 4 – 6b The Palisade Repeat Photograph

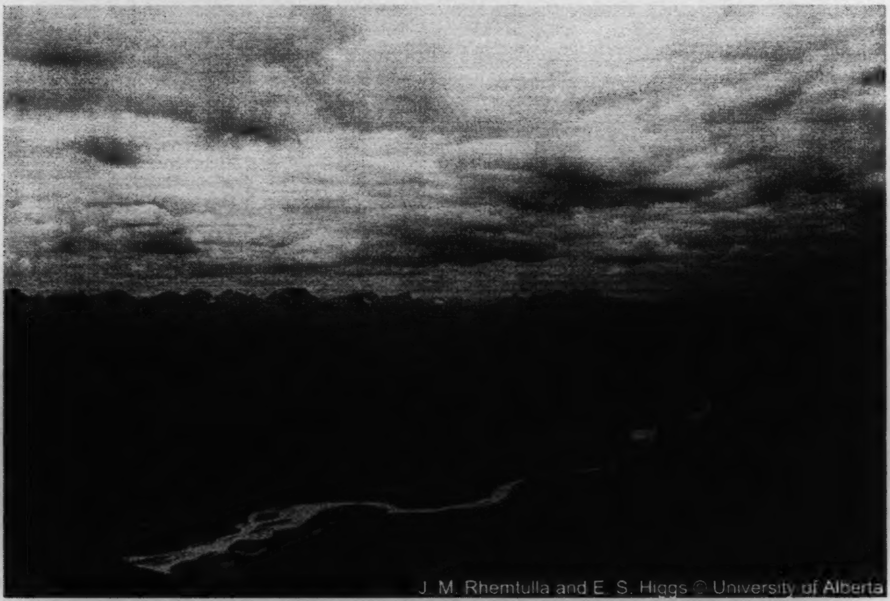
Plate 4 – 7 Photograph #282 Station Roche Bonhomme

The view of the photograph is north-west, taken from the east side of the Athabasca River. The Maligne River is out of photograph view to the south. In 1915 the landscape of the east side of the river along the riverbank is variable with small patches of grassland interspersed with open forest and shrubland. The riverbank is lined with trees. The slopes of Roche Bonhomme are vegetated with patches of forest. The Henry House grassland is clearly depicted on the west side of the river. The flats are grassland interspersed with shrubs. The north-east facing slopes of The Palisade are forested. The vegetation cover is forested in the higher elevations with variable patches interspersed with forest extending up the slope. There is grassland on both sides of the Snaring River at the lower elevations with forest at the higher elevations. The variable landscape comprised largely of grassland and open forest as depicted in 1915 has been encroached by forest in the 1990's. The east side of the river is heavily forested, except for a patch of grassland near the riverbank. The west side of the river on the flats has been encroached by dense forest, except for the remnants of the Henry House grassland. There are small patches of grass and shrublands along the river. The upslope of the Palisade is densely forested and can be seen in the centre of the photograph. Depicted on the top-right of the photo the grasslands on the north-east side of the Snaring River have been encroached by forest.



M. P. Bridgland. Courtesy of Jasper National Park

Plate 4-7a Roche Bonhomme Bridgland Photograph



J. M. Rhemtulla and E. S. Higgs © University of Alberta

Plate 4 –7b Roche Bonhomme Repeat Photograph

Plate 4 – 8 Photograph #427 Station Mt. Henry

The view of the photograph is south, taken from the station along the Miette River valley above Minaga creek. In 1915 on the north side of the Miette River valley extensive grasslands interspersed with shrublands on the rolling land of the lower elevations are depicted. The grass and shrubland areas extend up the slope. The higher elevations have more forest cover. The wetland depressions are ringed with small forested areas. The south side of the Miette River valley is mixed grassland and shrubland on the lower to mid-slopes with open forest areas on the upper slopes. On the far left side of the photograph the entire slope is mixed grass and shrubland with small patches of forest. The 1915 photograph depicts a variable landscape at both low and high elevations with a tendency for more open forest cover at the higher elevations. The pattern of grassland and open forest depicted in 1915 along the valley and up the slopes has completely disappeared by 1999. Extensive forest encroachment on grassland and increase in forest density is visible throughout the photograph area regardless of elevation.

Plate 4 – 8a Mt. Henry Bridgland Photograph

Plate 4 – 8b Mt. Henry Repeat Photograph

Plate 4 – 9 Photograph #247 Station Mt. Tekarra III

The view of the photographs is north-west, taken from the east side of the Athabasca River south of the townsite. In the centre-left of the photos the Miette River is going west into British Columbia. In the 1915 photograph the Old Fort Point grasslands are clearly visible in the centre. The townsite is visible on the west side of the river. In the foreground of the photograph at 100% zoom the slopes of the mountain are shown to be large areas of burnt forest with shrubs and conifers beginning to regrow in patches. On the right side of the photograph, to the right of the townsite, on the west side of the river an expansive grassland is visible that extended from the flats up the slope of the mountain. A few scattered trees can be seen on the rocky outcrops on the far right. To the left of the townsite on the south side of the Miette River valley grasslands with small patches of shrubs and forest prevail, while on the north side of the valley mainly forest cover is evident. The lower elevations in 1915 tend to a variable vegetation cover of grassland and open forest. The higher elevations and north-facing slopes have more forest cover. The grassland and open forest above the townsite is encroached by forest in the 1990's photo. The grasslands at Old Fort Point in the centre of the photo are also encroached by forest. The expansion of the townsite is clearly visible, as is a widespread increase in forest density regardless of elevation.

M. P. Bridgland. Courtesy of Jasper National Park

Plate 4 – 9a Mt. Tekarra III Bridgland Photograph

J. M. Rhemtulla and E. S. Higgs © University of Alberta

Plate 4 – 9b Mt. Tekarra III Repeat Photograph

Photograph Analysis

All of the 1915 photographs depict a more variable landscape than that depicted the 1990's. Forest encroachment in the eighty year period occurred in both lower and higher elevations, but most prominently in the lower elevations. Forest density increased in the higher elevations. The distinction between the vegetation cover on north and south-facing slopes and at low and high elevations has vanished in the repeat photographs. The extensive grassland areas around Jasper Lake in 1915 have basically disappeared by the 1990's. Forest encroachment in these grasslands are depicted from the stations at Roche Miette, Roche a Bosche, and Mt. Greenock. The outer edges of the Henry House grasslands have been encroached by forest, but the central portion of the grassland remains intact. Undoubtedly the unencroached grassland was aided by the prescribed burns that occurred in this area in the 1970's and 1980's, described in chapter 3. The grazing impact of herbivore populations in these limited grassland areas has likely contributed to the lack of forest encroachment. The grassland and open forest landscape on the northeast side of the Snaring River, depicted from Roche Bonhomme, have been encroached by forest. Mt. Henry depicts a similar circumstance around Minaga creek. The view from Mt. Tekarra concludes the depiction of the UAV, and illustrates the encroachment by forest into grasslands formerly in the Miette River valley and Old Fort Point.

The 1915 and repeat photographs are an unparalleled source of information on the visual changes in the UAV over an eighty year period. Both grassland and shrubland are significantly diminished, while forest size and density has increased (Rhemtulla, 1999). The forested areas on the north-facing side of the Miette River valley remain throughout the period. The heterogenous landscape of 1915 has largely turned into a homogenous forest, intersected by highways, railways, and the expanding townsite. The concept of the closed, dark, forested "wilderness" (minus the highways, railways and townsite) is reflected in the repeat photographs and not in the open, variable landscape of grassland, shrubland and forest in the lower elevations of the Upper Athabasca Valley in 1915.

4.4 Fire History of the UAV

The photographs taken by Bridgland in 1915 and Rhemtulla and Higgs in the 1990s depict significant landscape change. The records of Aboriginal controlled burning and fire history studies describe one reason why there has been such a shift in the composition of the UAV - the lack of fire. Described in the fire ecology section of chapter 3 the ecology of the grassland and open forest landscape, depicted in many of the 1915 photographs, is dependent on fire. In this section the fire records, both Aboriginal and fire history studies, are described along with the historical observations of burnt landscapes in the UAV.

4.4.1. Aboriginal fire records for the UAV

There is not a substantial quantity of specific information about the use of controlled burning by Aboriginal communities in the UAV. The lack of scholarly interest in the subject until the 1980's in combination with the death of most of the members of the Aboriginal homesteaders, precluded the collection of a significant body of knowledge. The most extensive discussion of the specific practices of controlled burning by Aboriginal people in the UAV comes through a 1980 interview with Ed Moberly. As a child living in the UAV before the community was evicted in 1910, Moberly described the social context of burning, some reasons for burning and detailed some locations of fires.

Moberly described how burning was a community activity. Everyone would help each other with the fire control, including the children. Children helped to control the fire spread with spruce boughs dipped in water. Some adults also had spades and/or picks (Moberly, 1980, p. 11). "So you have to figure out how you control, and the best I've seen beside the pump is spruce boughs... dip them in water -and as the fire goes along, as long as the fire doesn't go too fast - there's no wind- you can control like that - that is, a grass fire - very neatly" (Ibid). Planning was an integral part of the activity, determining the proper time to burn, getting the community together, gathering spruce boughs, and ensuring a water supply all required forethought and organization.

Moberly described how burning was always done in the UAV in spring, that the snow cover was watched until conditions were right (Ibid, p. 7, 10). "Then in the spring that's the first thing everybody does is burn the meadows" (Ibid, p. 7). The right time to burn was when the grass was still wet under the forest, sometimes when there was still a small amount of snow cover: "sometimes you have to do it earlier than other years, you see, it depends - but they watch that very close" (Ibid, p. 8). Detailed knowledge of the landscape and prevailing conditions is reflected in the timing of controlled burns, and the annual variation in timing. Preparedness was essential near the controlled burning season, otherwise the safe window of opportunity could be missed.

The wind was watched very closely as it was a critical factor in these controlled fires. Some of the burning, particularly patch burning or firebreaks, had to be done when it was absolutely still. A fire would be started in the east to a firebreak, and then another fire started in the west and there would not be enough fuel to cross the first area burned (Ibid, p. 7). Knowledge of wind was essential, from direction of the wind, the time of day of prevalent wind currents, to topographic changes in the wind, all had to be taken into account when a fire was planned and ignited. The wind tended to blow up in the daytime, die down late afternoon and blow up again in the early evening and throughout the night (Ibid, p. 10). Detailed knowledge of wind currents and how and when the currents change, reflects the phenomenal body of knowledge the Aboriginal homesteaders had about the landscape of the UAV.

Some islands in the Athabasca River were completely burned as a source of firewood. The standing trees would then be ready, i.e. cured dry, in about a year for cutting (Ibid, p. 8). Fires would be set to ease access to specific areas, for example for hunting. Moberly described that fires were not commonly set in the "bush" except for hunting purposes. Without fire travel was difficult in dense forests, so fires would be set to make the traveling easier (Ibid).

There were broader goals for fire use beyond specific purposes like curing firewood and easing hunting difficulties. Properly used fire could create desirable landscapes. The Aboriginal homesteaders understood that if fires were not set that the animals would get sick from grazing in unburnt areas. "Burning the meadows or bush to heavy bush land - burn that out - then the grass begins to come lively again - for the stock to feed in. I think that's a good thing that keeps disease down..."(Ibid, p. 15). Fire was used by the Aboriginal homesteaders to create a healthy landscape, for people and animals.

Some specific locations for fires were described, all of the locations referred to by Ed Moberly were associated with hunting. Bighorn sheep live on patches of grassland on south-facing slopes within large areas of forest. Bighorn sheep require connectivity, they are reluctant to move through heavily forested areas or large expanses of flat land (Noss and Cooperrider, 1995, p. 255). The burning practices for hunting areas reflect the knowledge of bighorn habitat needs by the Aboriginal homesteaders. The Jack [Jacques] creek area was burned and it was a good location for hunting. Some areas of the Snake Indian River Valley were also burned to get into the hunting grounds (Moberly, 1980, p. 9). Sheep ranges were burned at various locations (Ibid, p. 16). Fires did not often get out of control, as the landscape at the time was more open:

> Yes, one got away on my uncle one time, but didn't get to the timber. It burned more willow, and opened up more of the meadow. It didn't get to the timber. And at this time we didn't have all the jack pine there is now - it was more open. Now, this undergrowth and things - that comes - between them days and now (Ibid, p. 12).

Ed Moberly did not discuss the use of fire to maintain berry grounds, or areas where roots or other plant materials were gathered. The beneficial effects of fire on areas where roots like tiger lilies were gathered, discussed in the literature for other regions in chapter 2, would most likely have applied to the UAV as well. As a man Moberly learned the uses of fire important to men, namely hunting. The women homesteaders in the UAV were never interviewed, and have long since passed on.

The effect of fire suppression policies on the Jasper families was described in their concern for the effects on the grazing for their livestock. There was also concern for the effect on the grasslands, as the Jasper families recognized that fire was beneficial for grassland health. "You see, right (from) the beginning this protecting of forests and things - it's all come as the white man drifted in here - and everybody tried to follow that regulation because they can see, well fire destroys - but to burn the meadows, I still say that's a hundred percent" (Moberly, 1980, p. 20). The change in regulations with the advent of European control was a concern to the homesteaders, a landscape health and management concern.

Specific reasons for setting fires were described for islands where trees could be turned into standing firewood, and easing access into forested areas for hunting purposes. However it is the understanding that without fire set by the community the land would not be as healthy and the animals and other species would suffer as a result that is the key point. The concern over the effect of fire suppression on the health of the land, particularly grassland, speaks to the philosophy behind fire technology. It was the duty of the community to adequately care for the landscape, and maintain the landscape in a form that benefited humans and animals. The role of humans in nature was well understood by the Aboriginal homesteader community, and the human role is that of a caretaker.

Knowledge of controlled land management fires has been kept by the descendants of the Jasper families. In recent interviews for this study a grandchild of the Jasper families described the importance of fire technology to the Jasper homesteaders. She discussed the basic elements of fire technology: seasonal use, control factors, landscape health, and described the continuity of knowledge transmission. Seasonal fires were described, the families only burned in the spring. These were controlled burns, with an emphasis on control. The families would only burn when there was no wind. The Elders' uncle and grandfather talked about controlled fires in Jasper, they needed the fires to maintain the grassland. She discussed land health and the use of fire to maintain it, how the families used fire to keep the grasslands healthy and to keep down the bush. The specific areas where people burned in the UAV were not recollected, she described how the homesteaders burned where they needed to. A continuity of the traditional use of fire was also described, as community members still burn in spring, when the conditions are right in the area. These burning practices are described as keeping the grasses nice and plentiful (PB interview with MD, July 6, 2002).

The fires used by the Aboriginal homesteaders to create the desired landscape were not only controlled fires. The deliberate selection of a particular area to burn and the definitive goals of burning are more reflective of prescribed fire. A prescribed fire is more deliberate, and is in fact managed by a socio-ecological institution, than a fire that is merely controlled. There were many different goals for prescribed fires described in the oral histories: burning islands for firewood, corridors for travel, grassland and encroaching forest for sheep range, and maintenance of landscape health. The patterns on the landscape left by these prescribed fires would also help to limit or control any wildfires in the valley. This combination of both controlled and prescribed fires illustrates the remarkable socio-ecological institution of fire maintained by the Aboriginal homesteaders in the UAV.

The continuity of the knowledge of traditional fire management is indicative of the importance of this management technology to the community. The fact that this knowledge has been maintained is significant, despite the characterization of fire as dangerous by government officials, and penalties assessed to those starting fires. The fire mosaic pattern of yards and corridors described in chapter 2 was recounted for the UAV. The correlations in information about seasonality, weather conditions, and ecosystem maintenance illustrates how important management institutions and traditions like fire are carefully passed down from one generation to another. The transmission of such history continues to this day.

4.4.2. Fire History Research Studies

There have been several fire history research studies conducted in JNP during the last twenty-five years. The study by Tande (1977) of the fire history of JNP remains a seminal work in this area. He described the fire history for a study area that covered the Upper Athabasca River valley, and portions of the Snaring River valley, Maligne and Miette River valleys (p. 89). Though this study does not quite cover the entire study area for this project, as Tandes' northern extent is the Snaring River, it provides critical information. Tande conducted an extensive tree fire scar study, estimated fire intensity when possible, and mapped the burned areas to create stand origin maps. The dates covered by his study range from 1665 to 1908, the relevant years for this project being approximately 1800 to 1908. Table 4-1 depicts the year, location, intensity and area burned during the relevant period. The fire record before 1810 is more approximate as the evidence for these early fires was destroyed in large conflagrations that occurred in 1847 and 1889 (Ibid, p. 102). Tande was conservative in the compilation of the stand origin maps: "I am confident that the fire maps are accurate back to at least 1821. Before this date, extents of burns indicated by the maps are conservative estimates, and may actually have been substantially larger" (Ibid, p. 62). Tande's study revealed that there is a greater occurrence of fires in lower than in higher elevations, creating a complex landscape mosaic:

> Extensive tracts of even aged forests at middle to high elevations originated after the largest major fires such as 1847 and 1889. In terms of both age structure and the associated fire history, valley bottom areas are more complex than those at higher elevations. This indicates that fires were more frequent and less intense at lower elevations, leaving many remnants from previous fires (Ibid, p. 60).

Table 4-1. Fire History of Central JNP. Henry House (HH), Prairie de la Vache (PV)

Year	Location	Intensity	Area Burned
1908	HH and area opposite, Edith L., Old Fort Point	low	no even aged stands larger than 45 HA
1907	Edith L. to Maligne R., mid-slope Roche Bonhomme	low	no even aged stands larger than 45 HA
1906	Miette R. near townsite, PV, Mt. Tekarra, Astoria R.	medium – high	valley bottoms, Maligne R. high elev. intense, mid-elev. less

			intense
1905	townsite to Pyramid Cr., south & west of HH, Minaga Cr. area, south PV	low	no even aged stands larger than 45 HA
1903-1904	south of HH, low elev. of Hawk Mtn.	low	small fire areas
1901-1902	Miette R. – Athabasca R. confluence	low	small fire area, overlap with 1902
1899-1900	Edith L., Pyramid Cr.	low	small fire areas
1894-1898	Cabin L., Whistler Cr., Edith L., Maligne R., south of HH	low	small isolated fires
1889	Athab. R., Miette R, Maligne R., Snaring R valleys up slope	medium – high	med in low elev., high in mid-high elev. forests
1888	Mina L., Pyramid Cr., HH area	?	overlap with 1889 fires
1884	PV, Edith L.	low	restricted to low-mid elev.
1883	Patricia L, Annette L., Trefoil L.		mid elev. Patricia L.
1880	Patricia L. to Pyramid Cr.	low	restricted to low-mid elev.
1876-1878	near townsite	low	small area
1869	townsite to Pyramid Cr.	low	restricted to low-mid elev.
1863	Patricia L. to HH, PV	low ?	restricted to low-mid elev.
1858	Patricia L. to Cabin L. to PV and south Athab. valley	low – medium	restricted to valley bottom
1847	Snaring R, Miette R. valley, Old Ft. Pt to east, Annette & Edith L., Maligne R. to Garonne Cr.	medium – high	high intensity at high elev., overlap with 1889 areas
1846	Whistler Cr. to Maligne R.	low-med	restricted to valley bottom
1837	5 Lakes, Astoria R., Whistler Cr. to Caledonia L to Pyramid L.	medium – high	overlap 1889 & 1847, north-facing subalpine forests
1834	Cabin L to Patricia L to Pyramid Cr.	low – medium	valley bottoms & lower slopes
1811-1821	PV, Miette R. near townsite	low	valley bottoms & lower slopes
1807	Dorothy L, Cabin L to townsite, PV, HH & opposite area	medium	isolated, overlap 1811-1821
1797	PV, Mina L. to south of HH, Edith L.	medium	isolated, overlap 1807 & 1811-1821

The fires were often restricted to valley bottoms and lower slopes, and were of low to medium intensity, the fires of 1811 to 1834,1846, 1851 to 1884, 1892 to 1908 were of this type. The Athabasca and Miette river valleys burned in 1837, and it was a more extensive fire year with high intensity fires burning into north-facing subalpine forests (Ibid, p. 100, 101). More than half of Tandes' study area was burned in 1847 with moderate to high intensity fires, especially hot in the high elevation areas. The fires of 1888-1889 burned over 80% of Tandes' study area and were of medium to high intensity, medium intensity in the lower elevations and high intensity in high elevations (p. 99). Furthermore, it appears that 1889 was a big fire year in much of western Alberta. The Department of the Interior Annual Report for 1889 describe extensive fires in the Rocky Mountains and foothills of Alberta (Department of the Interior, A. R. 1889). The 1904 to 1908 fires were also largely small and low intensity, with the exception of 1906 where medium to high intensity fires occurred. The 1906 fires burned through the Prairie de la Vache area, and was more intense in the Athabasca River valley bottom and the upper mid-slopes of the Maligne Range (p. 98). Tande's fire history reflects a largely low to medium intensity fire regime in the UAV with small isolated fires occurring regularly, and there are also the occasional year of large and high intensity fires, such as those of 1847, 1858 and 1889.

There were areas of fire overlap particularly in the lower elevations. The Athabasca, Miette and Maligne River areas, Henry House and the area across the river, Edith and Annette Lakes, Pyramid Creek, Patricia Lake, and Prairie de la Vache experienced a succession of fires. Henry House, for example, burned in 1797, 1807, 1863, 1889, 1903, 1905 and 1908. Edith Lake burned in 1847, 1861, 1884, 1889, 1894, 1899, 1907, and 1908. These areas of overlap would undoubtedly affect fire intensity due to the reduction of available fuel.

Burn direction was more difficult to determine from the fire scar data. Tande determined that the fire scars generally followed the pattern of prevailing winds in dry weather. The 1906 fire burned south up the Athabasca River valley and spread upslope. The larger fires were more complex, and no pattern could be determined for the 1889 fire (Tande, 1977, p. 104).

Why would there have been large fire events in 1847 and 1889 if Aboriginal prescribed fire management was operating? There are a number of factors to take into account. There are no data on the number or season of fires in either year. It is unknown whether these large areas burnt at one time or in fire patches throughout the year. Tande described both years as characterized by high intensity fires in the high elevations. The high elevations were not of great interest to the Aboriginal communities and were not regularly burned. Fuel accumulation patterns would thus have been different in the high elevations. The variation in intensity during these intense fire years described by Tande reflects the presence of different fuel loads in the higher elevations than in lower elevations.

Several factors influence the dendrochronological fire record. Huge fires like the one in 1889 which burn at a high intensity over large areas may obliterate the record of previous fires. The variability of intensity across the terrain cannot be truly represented in fire-return-interval or time-since-fire studies (White, Feller and Vera, 2002, p. 399). Low and medium intensity fires may not scar trees, and thus such fires are not recorded in the dendrochronolgical record. As described more fully in the fire ignition controversy section in chapter 3 if there is no fire scar then the record of that fire will not appear in dendrochronological data. Thus the complexity and variability of fire across the landscape may not be reflected in the fire histories based solely on fire scar studies.

The study of Rogeau, Fortin and Pengelly (2002) of mapping fire cycles using a topographic model in Banff National Park contains information relevant for JNP as well. The topographical influences on mountain landscapes mean differences in elevation, orientation, and slope affect the landscapes' fire cycle (Rogeau, Fortin and Pengelly, 2002, p. 4). Topography affects, directly or indirectly, the likelihood of a fire spreading, the direction of spread, fire size and fire pattern. Elevation affects fire cycle through the wetter fuels at lower elevations, and greater occurrences of lightning at higher elevations. These factors compounded with the amount and type of fuel available influence fire events (Ibid, p. 5). The cool north-facing slopes tend to burn less frequently but more intensely than south-facing, due to infrequent dry conditions and fuel load buildup. Valley orientation also affects fire frequency: small valleys perpendicular to main ones burn less frequently, possibly influenced by lightning strikes in minor drainages being intercepted above the treeline. In addition, human use tends to be less intense in these regions (Ibid, p. 7). Forest stand age is also a factor, with the younger stands occurring on the southwest facing slopes. The montane ecoregion has younger forest than the sub-alpine (Ibid, p. 14). The montane ecoregion, south-facing slopes and main valleys, have positive correlations with more frequent fires (Ibid, p. 15). All of the factors having positive correlations with frequent fire in Banff National Park are also found in the UAV.

Van Wagner (1995) analyzed the fire history for Banff, Jasper and Kootenay National Parks. This study was based on sets of data for the park area calculated by the date of the last fire as determined through field surveys. The average age of the whole forest was calculated from information on 20-year age classes (Ibid, p. 1). The average forest age for Jasper as of 1930 was about 120 years (Ibid, p. 9). Jasper's fire history data is complex and difficult to interpret because of missing data. One factor causing this missing data was the size and intensity of a relatively recent fire, the 1889 fire, that destroyed some of the previous fire history data: "The big burn of 1889 is seen to be, in theory, by no means unique... the record suggests that burns equal to a fifth or a third of the park occurred once or twice per century" (Ibid).

The study of Rhemtulla (1999) demonstrated the change in vegetation composition in the UAV during the eighty-year period from 1915 to the 1990's. There was a general trend of increase in forest at the expense of grassland and shrubland cover types; there was also an increase in crown closure (p. 71). This study demonstrated that the forests grew in both size and age between the analysis of the first aerial photograph in 1949 and the aerial photographs of 1991. Changes in the forest composition were also evident, 97% of coniferous forest remained coniferous between 1949 and 1991, while 41% of the deciduous forest in 1949 had become mainly coniferous by 1991 (Ibid). The most stable cover types were water, forest and rock, and some cover types changed in a variety of ways: "Less that 10% of forb cover in 1949 remained within that cover type in 1991, 51% changed to shrub, 15% to forest, and 10% to water" (Ibid). Open forest and grassland areas were impacted by a general successional trend: "Increased canopy cover was observed in approximately 72% of the open forest... Forest encroachment [on grasslands] occurred with less frequency in flat areas, and greater frequency on south-facing slopes and within 100m of existing forest patches, as compared to the overall distribution of grass areas in 1949" (Ibid). Elevation was a factor in crown cover; unchanged or increased crown cover were most likely at elevations below 1050m, decreases were most prevalent at middle elevations, and increased crown cover were more likely at the upper limit of the montane ecoregion (Ibid, p. 76).

Rhemtulla's study demonstrated an increase in both the area of forest cover, and the homogeneity of forest vegetation composition in the montane ecoregion of the UAV. But the story is more complex than that statement indicates. There were differential rates of forest invasion. The most significant rates of forest encroachment occurred on south-facing slopes, which is the opposite of what has occurred in other areas, and within 100m of existing forest. Rhemtulla offered several explanations for this trend: "It may be that moisture availability is not a limiting factor for forest encroachment in the study area. It is also possible that fire events in the past occurred more frequently on drier south slopes, thus restricting the encroachment of forest more on these slopes than elsewhere" (Ibid, p. 80).

Changes in forest composition also varied by elevation. Crown closure increases were most likely at lower elevations, and decreases were more likely at middle elevations and on south or west-facing slopes. The greater warmth of lower elevations may influence the rapidity of succession in these areas as well as the fire frequency. Decreases in canopy cover may be associated with areas that experienced wind, insect or fire disturbance, like the Colin Range prescribed burn that occurred at middle elevations. Another explanation offered by Rhemtulla related fire frequency to elevation, and thus to forest age:

> It is also possible that fire frequency was previously highest at the lowest elevations in the montane. Fire exclusion over the last century may therefore have had the greatest effects at lower elevations... Historically, fire frequency decreased with elevation. Thus older stands may occur at higher elevations, and stand break-up may explain the higher incidence of decreased crown closure (Ibid, p. 81).

Rhemtulla's study indicated the complexity of the factors involved in the landscape changes that have occurred in the UAV over the last century. However, the increase in homogeneity of the landscape is connected with the decrease in disturbance events. "Fire, wind and disturbance by insects typically produce complex patterns; patch size and shape on the landscape is a direct reflection of this disturbance history. In the absence of disturbance events, vegetation is expected to converge towards older successional stages with time, resulting in a more homogenous landscape" (Ibid, p. 82). Future studies that specifically examine landscape homogeneity will further the understanding of these complex issues.

Rogeau describes the fire return intervals (FRI) for areas in the central part of the UAV, see Table 4-2. Her research was in the heart of the UAV used by Aboriginal communities; the revelation of frequent fires is significant. The occurrence of fire in lower elevations of the UAV was frequent, with areas of 80 to 160 hectares burned annually. In the area between Henry House and the Snaring River, on the west side of the Athabasca River, fires burned approximately 80 hectares a year since the eighteenth century. On the opposite side of the Athabasca River, fires burned about 160 hectares a year during the last two hundred years (Rogeau, 1999, p. 24, 31). The tree scar research in the Jacques range (described as an area burned by the homesteader families in the interview with Ed Moberly) indicates that there were slow moving surface fires at this specific site (Ibid, p. 26).

Table 4-2. Fire Return Interval for areas in Jasper National Park

Area	Fire Return Interval	Mean Fire Return Interval	Area Burned
Snaring R. to Moberly Flats	from 1720-1932 5 to 43 years	since 1720 28 years	

Moberly Flats to Corral Creek	1700-1898 5 to 80 years	since 1700 22 years	80 HA per year
Colin Range to Jacques Creek	since 1745 1 to 34 years	since 1745 13.08 years	
Jacques Creek to Cinquefoil Creek	since 1815 5 to 20 years	since 1815 13.33 years	160 HA per year

Foothills Model Forest fire history research (Andison, 2000) describes the highly variable nature of fire activity in JNP. There are significant differences between the fire activity in the lower and higher elevations in JNP, detailed in Table 4-3 adopted from Andison (2000). In a single 20-year period fires may have consumed from six to 54 percent of the montane forests, versus five to 32 percent of the lower subalpine and one to seven percent of the upper subalpine forests (Andison, 2000, p. 8). Many lower subalpine fires originated from the montane areas (Ibid, p. 11). The estimates for burning levels are more accurate for the more recent disturbance frequencies (Ibid, p. 7). This factor was also noted by Tande. Historically there was much more fire in the lower elevations of the UAV than in the higher elevations.

Table 4-3. Landscape Level Fire Effects in JNP

20-Year Period	Montane Percentage burnt	Lower Subalpine Percentage burnt	Upper Subalpine Percentage burnt
1911-1930	6	7	4
1891-1910	17	14	7
1871-1890	54	32	7
1851-1870	21	5	1
1831-1850	27	15	6
1811-1830	9	6	2
1791-1810	13	10	6
Average 1810-1911	21	12.7	4.6

The influence of fire in the UAV during the twentieth century is far less than during the nineteenth century. The variability of fire disturbance in the past has been replaced by almost no fire. During the last 60 years there has been only 2.3 percent of the forest burnt in the montane, lower subalpine and upper subalpine ecological zones combined (Andison, 2000, p. 8).

White's research delved further into the fire history record as he studied the season and source of fire ignition. He examined the hypothesis that human ignited fire was a significant influence in the fire history of montane meadows in the Rocky Mountains. The potential of meadows as the ignition point for spring fires ignited by Aboriginal people was the central focus of his research. Two of his sample areas, Prairie de la Vache and Willow creek are located in JNP. The mean fire return interval (MFRI) for Prairie de la Vache was 25 years (+/-2) and Willow creek was 40 years (+/-5) (White, 2000, p. 59) The fire interval data indicated that meadow edges had shorter fire intervals than adjacent forests, and warm aspects had shorter fire intervals than cool aspects (Ibid, p. 58). These data suggest that differential burning patterns existed around meadows. However, White states that the meadow fire history patterns did not strongly support the concept of frequent cultural burning. The timing of burn indicated in the fire scars from trees on the edge of meadows and in forested plots was similar, both in the spring or the dormant season (Ibid, p. 67). With lightning being most frequent in July and August, when grasslands are green and have sufficient moisture to prevent an ignition, spring or dormant season fires are indicators of a probable non-lightning ignition source.

White postulates that contrary to the idea of tightly controlled spring fires set by Aboriginal peoples strictly in meadows, his research data indicated that Aboriginal peoples set spring fires periodically in large areas of the Rocky Mountains burning both grasslands and forest (White, Feller and Vera, 2002, p. 408). White suggests that the large area burning practices reflected in his study may be related to the buffalo hunting of Aboriginal people. The buffalo in the Rocky Mountains disappeared by the mid-nineteenth century. It is likely that the previous movements of buffalo into the mountain valleys were directed by Aboriginal people (Ibid). Fire would be a logical tool to draw buffalo into grasslands and to provide enough forage to keep them there.

The recent study by Schindler and Zutter on the paleoecology of Annette Lake, which is near Edith Lake and opposite the Jasper townsite, and Marjorie Lake, on the north side of the Miette River valley approximately four kilometers north-west of the townsite, in JNP reflect some of the findings of dendrochronological studies by Tande. Paleoecological studies collect frozen cores from lakes and then the large particles of charcoal and pollen can be analysed for representations of large fires and vegetation types. The pollen records speak to the relative percentages of vegetation, the amount and type of pollen a species produces affects how it shows up in the record.

Lodgepole pine for example produces so much pollen that it has to be removed from the pollen analysis in order to determine the representative vegetation (C. Zutter, pers. comm April 12, 2001).

Macrocharcoal concentration is analysed according to whether the layer is above or below average. The large pieces of charcoal are indicative of regional fires, it is these pieces that are used to determine the occurrences of large regional fire events. Small pieces of charcoal are not necessarily indicative of regional fires, as these particles can be carried long distances by wind, or be created in the screening process from broken large particles (Ibid). Another limitation of macrocharcoal is the variability of deposition, for example if a large fire is immediately followed by drought then the macrocharcoal material may never be washed into the lake (D. Schindler and C. Zutter, pers. comm April 5, 2002). However, the preliminary results from JNP indicate that the large charcoal particles found in the frozen lake cores basically correspond to the findings of Tande for the occasional large fire in the region (D. Schindler and C. Zutter, pers. comm April 5, 2002).

Macrocharcoal found at Annette Lake indicated there were large fires at about 1360 A.D., 1600, 1780 and 1870-1880 A.D. The Marjorie Lake macrocharcoal indicated large fires at about 1850, 1872 and 1921 A.D. (C. Zutter, pers. comm April 12, 2001). There are, however, some differences between the two lakes. The Annette Lake cores indicate more fires than the Marjorie Lake cores. The location of Annette Lake is believed to have influenced this pattern, it is lower in elevation and closer to the valley floor than is Marjorie Lake (Schindler and Zutter, April 5, 2002). The 1889 fires do not appear in either of these lake cores, which reflects a limitation of the data for collecting fine scale fire history information. Generally, the large fires are depicted in the macrocharcoal particles. Small, frequent, low intensity fires may not be decipherable in the pollen and charcoal records (C. Zutter, pers. comm April 12, 2001). The techniques are too coarse to determine the occurrences of smaller fires (Schindler and Zutter, April 5, 2002). This paleoecological study described large fire events in the vicinity of the UAV approximately one hundred years apart since 1600.

There was a distinctive shift in fire return intervals before 1600. There appears to have been less fire in the UAV during this period. A number of factors may have contributed: climatic shifts or influences such as the medieval warm period across western Canada may have influenced the occurrence and recording of fire events

(Schindler and Zutter, April 5, 2002); different human occupation patterns in the UAV; and wind, hydrological or insect disturbance could also be involved.

New methods of identifying fire history in paleoecological records are being developed. A recent study of grass phytoliths in the paleoecological record of southwestern Manitoba has been helpful in reconstructing the anthropogenic fire frequency of the area (Boyd, 2002). Phytoliths are made of silica, a mineral that does not burn, and different plant species have particular forms of silica. Plant species have specific phytoliths that can be identified under a microscope, and used to determine the vegetation composition and the occurrence and intensity of fire in an area. This method interprets the ratio of burnt and unburnt phytoliths and can be used in addition to microscopic charcoal (Ibid). Similar studies have not been undertaken in the UAV, but are another method that could be used in the future to reconstruct fire history.

The fire history studies for the Upper Athabasca Valley describe a frequent fire regime in some areas, particularly the lower elevations, and a lower fire frequency in the higher elevations. Though few studies examined the seasonality of fire ignition, the study of White (2000) revealed a spring or dormant season ignition in grassland areas. Future studies on the seasonality of ignition will undoubtedly further the knowledge of fire ignition source.

4.4.3. Historically Observed Fires

In 1810 David Thompson made the following observation of fires in the UAV: He describes near the present town of Hinton, "Thomas describes our Route of the Morrow to be first abt [sic] West & then turning round to sw, to fall on the Athabaska [sic] River and avoid the Hill. We have now much burnt Woods in Places, but also much green Woods" (Belyea, 1994, p. 126). On November 30 descending into the lower elevations Thompson notes: "We now went over Land, over a high Bank of burnt Woods, which are all consumed to a mere trifle - the Ground is quite barren" (Ibid, p. 127). George Simpson also records the effects of fire in the UAV in 1824: "Our road was rugged and bad frequently covered with fallen Timber the country having been over run by Fire ..." (Merk, 1931, p. 32).

Milton and Cheadle in 1863 note the effects of fire in the UAV. As described at the beginning of this chapter, the effects of fire were noted in the vicinity of Henry House on a lightly wooded flat (Milton and Cheadle, 1901, p. 241). This was not the only description of a fire event, while traveling along the Miette River, just past where it joins the Athabasca River, they described the landscape. "Extensive fires had swept over this portion of the country years before, and great trees lay fallen across the path, tangled and interlaced on every side" (Ibid, p. 244). Milton and Cheadle observed the effects of the large 1847 and 1858 fires in the UAV.

The 1872 survey party recorded numerous observations of burnt land in the UAV. While traveling along the left bank of the Miette River [around Minaga creek] on September 11 Walter Moberly notes a burnt flat. The following day on a trail along the left bank that connected with the Athabasca River Moberly also records the effects of fire on a rolling and grassy flat (Moberly, 1872, September 12). Later in the month near the confluence of the Whirlpool and Athabasca Rivers Moberly states: "Another mile & a half over bush flat & open pine woods brought us again to the Athabasca river which we followed 2 1/2 miles along its right bank, timber nearly all burnt off & we reached the point where the Whirlpool river from the S.W. falls into it" (Ibid, September 22).

In December of 1872 Moberly's survey party was on the Athabasca River two miles below Jasper House, Moberly records: "Flats & low ridges, Burnt or lightly timbered with spruce, several sloughs which form a small lake run into flat ground on the right bank of the river..." (Ibid, December 9). Rylatt also described the effects of fire on the landscape and opines:

> Yet why is this beautiful Valley so rich, and yet so empty? Why is the devastation by scathing fire? Where are the Buffalo herds that should be grazing here? For their whitened skulls lie thickly around. Certain it is they come here no more, and why? Ask the redman; he can answer it. But he does not see, to make his home here now. No; he has driven the herds from this place, and as they depart, so does he, he goes after the meat. He it is who lighted the fires that has devastated spots in the Valley; that have robbed the mountains on either hand of a portion of their forest garment... (Rylatt, 1991, p. 163).

Rylatt's language reflects his perspective, and yet he observed the connection between fire, Aboriginal people and grasslands.

In examining the explorers and survey party records the question may be posed as to why only one burning fire is recorded. An important factor is doubtless the time of year. Thompson traveled through the UAV in the winter, thus his observations are impacted by the appearance of the landscape in that season. There are only two observation which recorded the UAV in May. Both observations were made by individuals traveling through the UAV as fast as possible, and the springs of 1814 and

1827 when Franchere and Douglas went through were late ones with extensive snow cover on the ground. May is the most safe and likely month for spring fires in the mountains, particularly on the south-facing slopes, unless of course there is still a great deal of snow cover. Described earlier in this chapter Milton and Cheadle found the remnants of a still burning fire near Roche Miette. This fire was burning on the north-facing slope at the end of June, which reflects the delayed advent of spring and the right time to burn on the cool, moist north-facing slopes. Ed Moberly described how people would watch carefully for the right time to burn, though he never discussed the ignition of fires in the autumn.

Moberly's travels through the UAV in September and December placed him in good seasons to observe the effects of fires, if not the actual ignition. The records of burnt land in mid to late September could indicate recent fires. Grassland after a fire does not appear burnt for very long, only a period of a few weeks. Two months after a grassland fire the only visual indication of the fire, except for charring very close to the soil, is the intense green colour of the vegetation. The appearance of shrubland and forested areas, with the charred branches of shrubs or trees remaining, reflect the passing of a fire for a longer period. In shrubland a fire is visible for one or more growing seasons, depending on the intensity of the fire. In the case of trees, a visual remnant of a fire will remain on the landscape for a number of years. The historical records appear to reflect the effects of spring and fall fires in the recorded observations.

4.5 Patterns on the Landscape of the UAV: 1810 to 1870's (MAPS)

The maps created for this chapter are based on the historical observations, Aboriginal oral histories, and fire history research studies. These maps are interpretative, visual tools that provide information on landscape patterns. They are not quantified representations of the vegetation composition history of the Upper Athabasca Valley in the nineteenth century. The nature of the information that is available for the UAV precludes recording exact locations of all vegetation features. The explorers, traders and surveyors differentially recorded the vegetation they observed. Each explorer was individually inconsistent in the amount of information recorded, and there were inconsistencies between the sources. In addition, some explorers recorded more information than others. Each explorer did not necessarily record each patch of grassland and trees identified by species. Some information was recorded and some was not. However, there is greater reliability on the locations of grasslands, as these areas were vital for both the grazing of pack animals and wild animals relied on for meat. Trees on the other hand were not consistently recorded and the historical observations do not adequately reflect the quantity and species of trees in the UAV. These maps reflect the information that is available on vegetation composition in the UAV.

Map layer one depicts the UAV from 1810 to 1831. There are several sources that provided information on this time period: Thompson, Cox, Franchere, Douglas, Simpson, and the Jasper House journals. Thompson's journal and the Jasper House journals were recorded during the winter and reflect vegetation composition information available at that season. Cox, Douglas, Franchere and Simpson were in the UAV during the spring.

Map layer two depicts the UAV from 1858 to 1873, in addition to the oral traditions provided by Moberly. Hector, Milton and Cheadle, Walter Moberly and Rylatt provided information on this time period. Hector was in the UAV during mid-winter, while Milton and Cheadle, Moberly and Rylatt were in the area during the spring, summer, fall and early winter. Ed Moberly noted specific areas that were burned by the Aboriginal homesteaders and these areas are depicted in layer two.

Map layer three depicts the fire history information from the detailed studies of Tande, Rogeau and White. Specific areas in the UAV with a known fire history, or fire return interval, are outlined and numbered. The shaded areas are regions where there is overlap in the vegetation composition. If a grassland or forested area is described in the same location at different time periods that region was identified and outlined. The maps depict consistency in the vegetation composition of the UAV during the nineteenth century. Grassland areas in 1810 to 1830 largely remain grassland areas in the latter part of the century. Most of the grassland areas also correspond to the areas with a high fire return interval or fire frequency as determined by Tande, Rogeau and White.

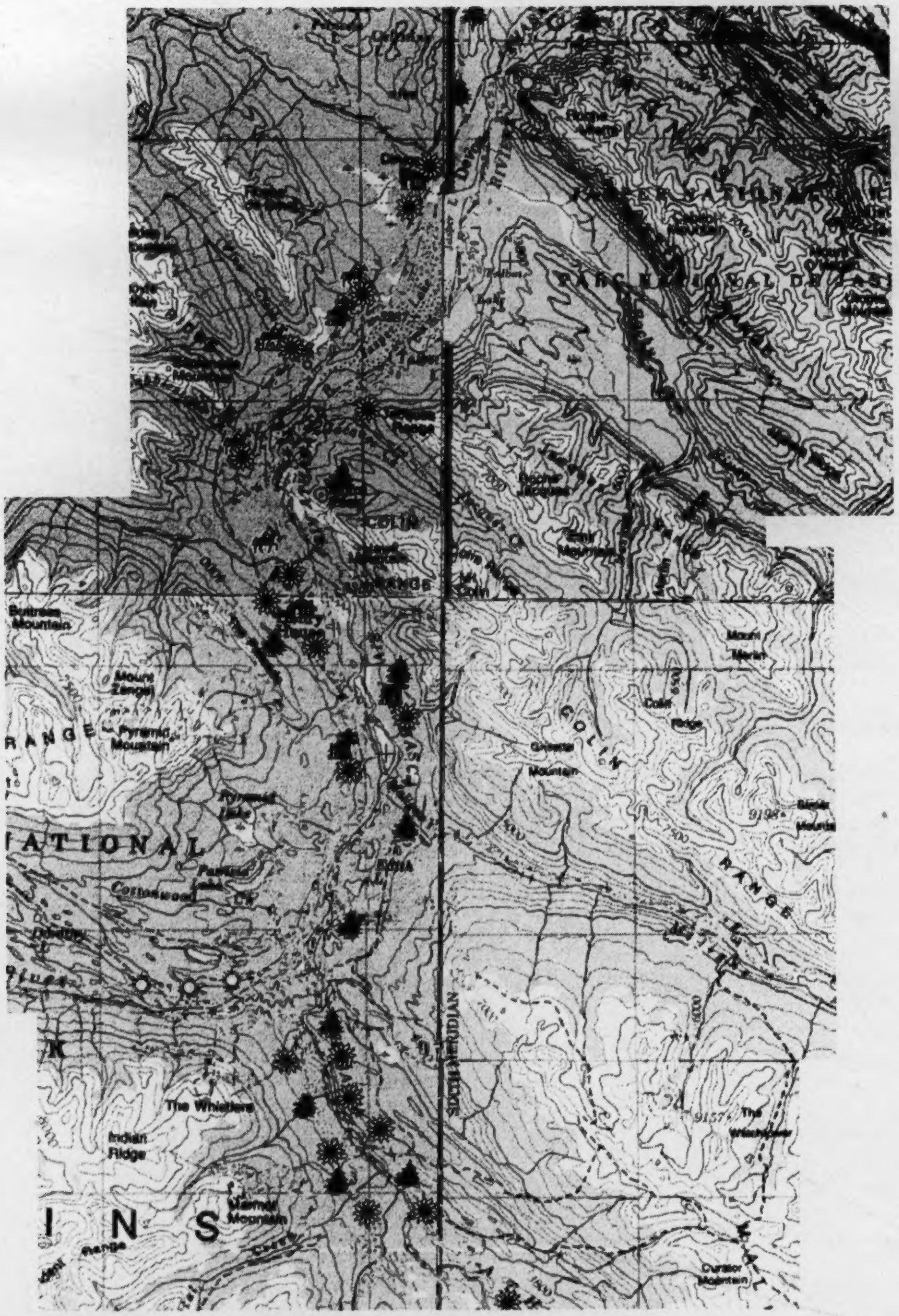


Figure 2 Legend - Map Layer 1 Upper Athabasca Valley 1810-1831

- grassland >1 acre
- forest >1 acre
- fire/burned area
- garden
- homestead
- grazing area
- fur trading post

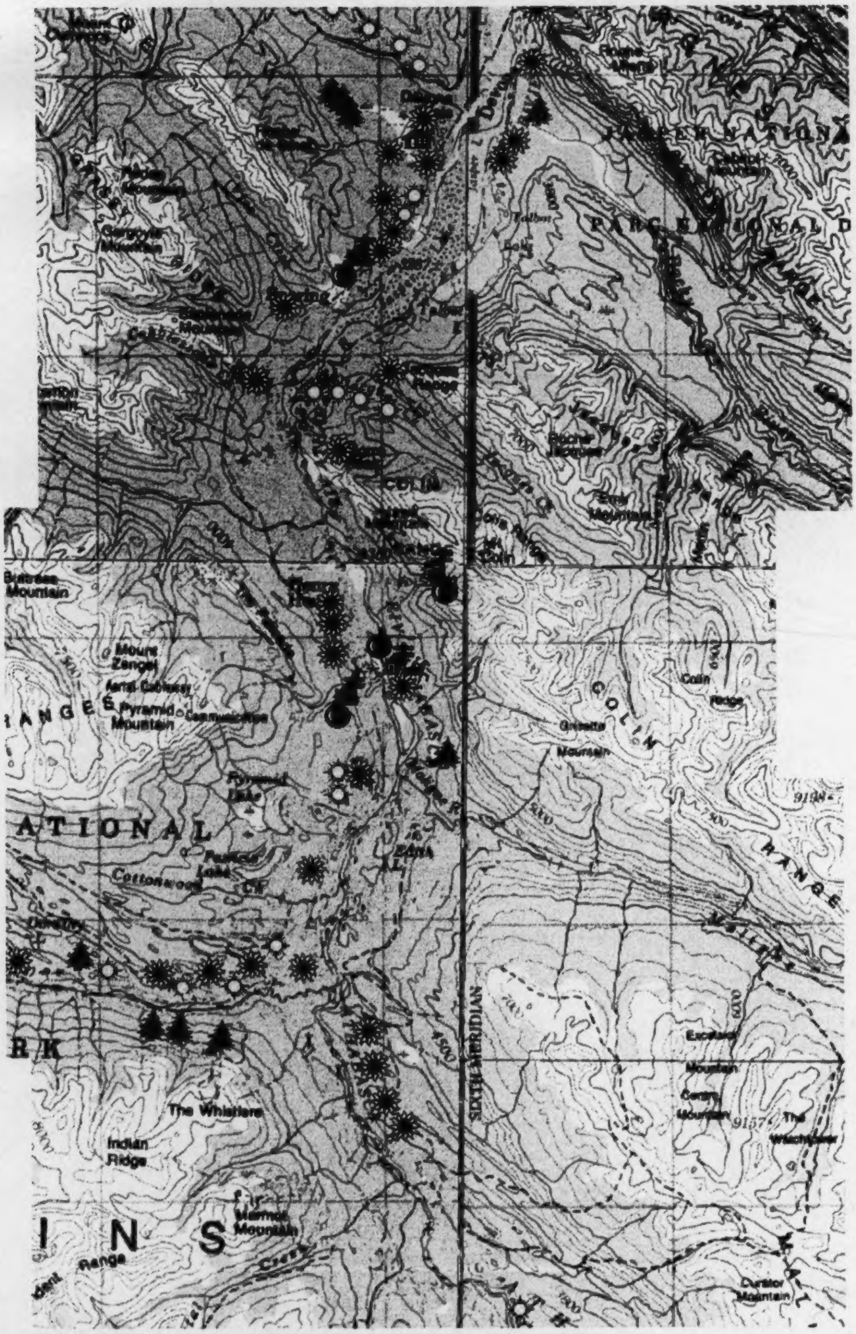


Figure 3 Legend Map Layer 2 Upper Athabasca Valley 1858 to 1870's

✹ grassland >1 acre
🌲 forest >1 acre
☼ fire/burned area

● garden
⌂ homestead
🐎 grazing area

🏠 fur trading post

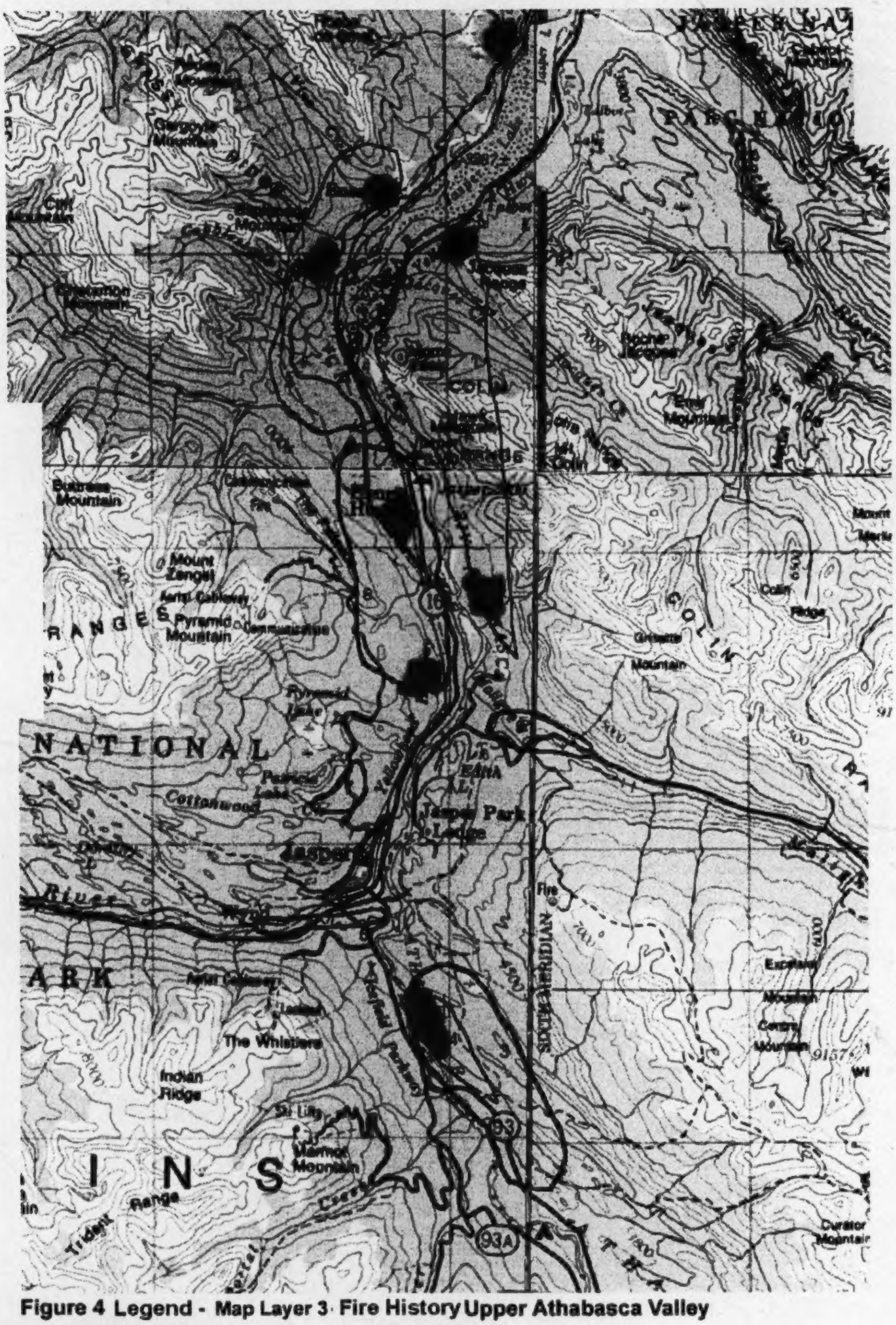


Figure 4 Legend - Map Layer 3 Fire History Upper Athabasca Valley

1. FRI 13.33 years ● Area of repeat fires
2. FRI 28 years
3. Fires 1811, 1858, 1863,1884, 1889, 1906
4. FRI 25 years
5. Fires 1811, 1847, 1889, 1901, 1902, 1906
6. Fires 1807, 1811, 1869, 1876, 1889, 1905
7. Fires 1834, 1837, 1858, 1861, 1863, 1869, 1880, 1883, 1889, 1905
8. Fires 1797, 1807, 1863, 1888, 1889, 1903, 1905, 1908

4.6 Discussion

In this chapter the historical vegetation descriptions, the 1915 Bridgland and 1990's repeat photographs of the UAV, Aboriginal fire records, and the fire history records are discussed. The source data was plotted on maps and landscape patterns were evaluated. This chapter examined the influence of fire on the landscape of the UAV. The frequent fires in the lower elevations of the UAV during the nineteenth century are described in the fire history records. The combination of historical, scientific and visual data sources depict the apparent consistencies in vegetation structure in the nineteenth century, and the substantial change in the vegetation structure that occurred during the twentieth century.

What about the role of people? The Aboriginal homesteaders believed their use of prescribed and controlled fire in the UAV helped to maintain, and even create, healthy landscapes. The historical vegetation descriptions reflect a more varied landscape than exists today: one of open forests, grassland and shrubland areas, with denser forests in the high elevations. Similarly, the 1915 photographs depict a distinctly variable landscape in the lower elevations of the Upper Athabasca valley and the Miette River valley. The 1990's repeat photographs clearly depict a densely forested landscape in many areas that were grassland, shrubland or open forest in 1915. The fire history records reflect a more frequent fire regime under the resource management of the Aboriginal homesteaders than exists today under parks management. These data are indicative of the important role that fire played in the vegetation composition in the past, and the greatly reduced influence of fire today.

The fire history studies of Tande, Rogeau, and White indicate a largely low to medium intensity fire regime in the lower elevations of the study area. Tande described the intensity of the large 1847 and 1889 fires as variable in the lower elevations and high in the higher elevations. Given the frequency of fire and the concomitant lower fuel load than is found today, a lower historic fire intensity in frequently burned areas is logical. Rogeau's findings that on average in the Snaring River area 80 hectares were burned annually, and 160 hectares were burned annually in the Jacques-Colin Range, are significant. These are areas known to have been occupied by the Aboriginal homesteaders in the latter part of the nineteenth century.

The fire history of the UAV indicates frequent fires in the lower elevations during the nineteenth century. Rogeau described a FRI of approximately thirteen years in the Jacques Creek area. According to Moberly this area was burned by the Aboriginal homesteaders. The Henry House area experienced at least eight fire events during the nineteenth century. White described a FRI of twenty-five years in the Prairie de la Vache, and Tande detailed at least six fire events in the area during the nineteenth century. The Miette-Athabasca River and Patricia Lake areas also experienced frequent low intensity fire during the nineteenth century. Dendrochronological records for the periods before the nineteenth century are less reliable due to burn over from subsequent fire events.

The data presented in this chapter do not contribute to a greater understanding of the role of lightning-ignited fire in the fire cycles of the UAV. No observations of lightning strikes were made in the historical records. Except for White's research into the season of fire ignition, determined to be during the spring or dormant season, the fire history studies do not clarify ignition source or season. It is very likely that lightning ignited some of the fires during the historical period.

The fire history studies are not evidence that people were a source of fire ignition. The Aboriginal fire records are evidence that people were a source of ignition during the nineteenth century. More importantly they describe why fire technology was important to the homesteader community, and why their community was important to the landscape. People were considered to be the arbiters of landscape health, or variation. Once the federal government removed these land managers and implemented a regime of fire suppression by the park that role ceased. Records of the uses of prescribed fire are more detailed for hunting than gathering purposes due to the gender of the person providing the information. The use of prescribed fire by women to improve the productivity of roots and berries has been well documented by Turner (1999). These methods would have been useful to the women homesteaders in their management of tiger lilies, wild carrots and the variety of berries that were harvested in the UAV.

The presence of grasslands in the lower elevations of the UAV is described in the historical records throughout the nineteenth century. The observation in the Jasper House journals of fat horses in February speaks to the consistent availability of forage for grazing animals during that winter period. It is difficult to extrapolate sustainability for gathering purposes. The lack of information on where women gathered and how they maintained these areas in the UAV confounds strong evidence for gathering management practices. However, the traditional ecological knowledge literature in chapter 2 along with evidence for sustainable management practices that have been demonstrated through Turner (1999) and Anderson's (1999) research indicate that sustainable management for important food or medicinal plants was a concern for many Aboriginal communities.

The Aboriginal homesteaders managed the UAV landscape to maintain features that were important to the community. Their management institutions were also intentionally designed to maintain a healthy landscape. The homesteaders were concerned that landscape health could not be maintained without intentional human fire. The contrast in the landscape conditions between the Bridgland and repeat photographs supports the homesteader's contention that fire was, and is, a necessary management structure for landscape variation in the Upper Athabasca Valley.

Chapter 5. Conclusion: Implications of the changes in the UAV

5.1 Summary of Research Findings

I argue that the Upper Athabasca Valley was a home to the Aboriginal homesteaders, and this homeland was managed and viewed very differently by the homesteaders than by today's users. The management practices of the Aboriginal homesteaders influenced the vegetation structure in the lower elevations of the UAV during the latter half of the nineteenth century. If ecological integrity is to be restored to national parks then incorporating Aboriginal communities is vital. Aboriginal communities are a part of Canada, and should be a part of Canadian national parks. Establishing cooperative relations between the park and the local Aboriginal communities must be a part of managing for ecological integrity and could be a new direction for Parks management.

I set out to demonstrate the impact of Aboriginal and Parks land management practices, if any, on the vegetation composition of the UAV. There is a strong correlation between the perspective and the implementation of management practices. The Aboriginal homesteaders lived at home and maintained the landscape through prescribed burning and grazing management practices that sustained their way of life. Park management viewed the land as a wilderness and developed infrastructure to draw tourists into the region. The subsequent suppression and prevention of fire ignitions had a strong influence on the vegetation composition: the heterogeneity of vegetation patterns that characterized the region during the nineteenth century has disappeared and been replaced with the over grown forest characteristic of one view of wilderness. There are consequences of management practices, and it is the landscape that bears and reflects these consequences.

How did the worldview of the Aboriginal homesteaders and park management affect their respective management practices? In chapter 2 I examined the link between worldview and management practice. These worldviews were factors in the nature of the relationship between human communities and the UAV landscape. The divergence between the perspective of a homeland versus a wilderness created different ways of interaction with the landscape. The Aboriginal homesteaders actively managed the landscape to maintain or create features that were desired by the community. National park managers removed the homesteaders and replaced them with temporary visitors. Wilderness can be viewed by strangers, while home is a concept reserved for specific people with strong ties to a particular place. Wilderness required the removal of Aboriginal communities and entailed the development of infrastructure such as townsites and the suppression of fires, which had the effect of increasing forest and decreasing grassland. The forest that accompanied this shift in worldviews leaves the impression of wilderness for popular Canadian society.

Why did the Europeans view the Upper Athabasca Valley as wilderness? Wilderness is not a physical landscape but a cultural perspective. The construction of wilderness values required the concept of a landscape safe from the industrial excesses of humanity, and a place that was a retreat from civilization. This concept was a founding principle of national parks in North America. In landscapes such as the Upper Athabasca Valley tourists escaped from their homes, daily lives and social expectations. For that escape to be effective the tourists had to be safe, comfortable and have recreational outlets: thus predator poisoning, the creation of golf courses, hot springs, railways, highways and luxury hotel resorts.

The Aboriginal homesteaders lived in the valley. The Upper Athabasca Valley was their home. Following Ingold (2000), the Aboriginal homesteaders were engaged with their environment. They acquired and implemented a complex of knowledge, skills, practices and beliefs specific to that community in that place. For the Aboriginal homesteaders taking care of home meant, in part, active management of the vegetation composition of the valley.

How did certain management practices, like prescribed fire, affect vegetation composition? Management practices not only affected but also helped to create the vegetation structure and composition in the UAV. Many fire events in the nineteenth century have been replaced by a few small prescribed burns in the late twentieth century. The increase in the amount and uniformity of forest cover and the closing of forest canopy visible at the end of the twentieth century are a distinct contrast to the variable landscape composed of patches of grassland and more open forest cover observed in the 1915 Bridgland photographs. A homeland was lost and a wilderness was created.

How did Parks Canada land management policies change during the twentieth century? Park land management policies have shifted perspective during this time period. The tourism and industrial development couched in the alternately protectionist and exploitative concepts of the early twentieth century have been replaced with ideas about ecological integrity, adaptive management, and a desire for sustainable and diverse landscapes.

What new directions for future management of national parks might exist? Implementing the worldview and management practice changes necessary to re-create sustainable and diverse landscapes in JNP, and other Canadian national parks, will be the future challenges for Parks Canada. The success of future park management lies in coalescing the knowledge of what is necessary with the new worldview required to implement these changes.

I reviewed the history of the wilderness paradox and the involvement of this concept in the creation of national parks in chapter 2. Following MacLaren (1999) this paradox is connected to the disassociation of Aboriginal communities from their traditional territories in areas that became national parks. Human uses had to be removed from the landscape. Early in their history Canadian national parks focused on development of infrastructure and attracting tourism. The management paradigms that resulted had an impact on the landscape unforeseen at the time: the Aboriginal homesteaders institution of use was replaced by the park institution of preservation. Recent changes to park management strategies are a departure from past practices and include incorporating the concept of ecological integrity and adaptive management in the management of Jasper National Park. The development of traditional ecological knowledge, systems theory and historical ecology are influential in the study of the relationships between humans and landscapes. These perspectives influenced the focus of my study on the interaction between the Aboriginal homesteaders and the landscape of the UAV.

The Upper Athabasca Valley in the nineteenth century was the subject of chapter 3. Microclimatic influences and the historical range of variation on landscape composition are essential aspects of landscape history. The influence of fire on fire-adapted ecosystems and a review of the prescribed fire program in JNP were presented. The fire ignition controversy in the Rocky Mountains informs the debate over the impact of anthropogenic fire in the region. Aboriginal history of the UAV extends over many thousands of years. The nineteenth century afforded new opportunities to local communities through the influence of the fur trade. The identity of the Aboriginal homesteader community was strongly tied to the UAV landscape and was impacted by the exodus from JNP.

Understanding the affect of the Aboriginal homesteaders on the vegetation of the UAV during the nineteenth century was the goal of chapter 4. The vegetation composition of the UAV during the nineteenth century was outlined by the historical documents of explorers, travelers and surveyors. The vegetation of the UAV described in these documents was a variable landscape in the lower elevations, composed of grassland, shrubs, and open and closed forested areas, and a more closed forest landscape in the higher elevations. The fire history studies describe a variably frequent and low to medium intensity fire regime in the lower elevations of the UAV. The fire regime in the higher elevations was occasional and of medium to high intensity. The oral traditions of Moberly, and members of the Aseniwuche Winewak Nation, describe a community that relied upon prescribed fire for a variable, and thus healthy, landscape. The 1915 and repeat photograph pairs are a visual record of the UAV landscape at 1915 and in the late 1990s. The photographs are a chronicle of late-nineteenth and twentieth century landscape history, and they depict change in the vegetational structure of the UAV, particularly in the lower elevations, during this period. The maps created for chapter 4 incorporate the vegetation composition descriptions and fire history in the UAV, and visually represent landscape patterns. Grassland areas comprised a significant feature of the lower elevations of the landscape in the nineteenth century. Some of these areas remain grassland throughout the period, and the overlap between these grasslands and the areas with a frequent fire history is considerable.

The role of people in the vegetation composition of the landscape has been the focus of debate in parks and academic circles. Park research has largely concentrated on dendrochronological and biological studies. While important, this research has not illuminated the role of people in both the historic and current composition of the Upper Athabasca Valley landscape. The fire ignition debate is an example of the dichotomy between human and ecologically focused research. The fire history of the area cannot be fully explained solely by lightning-ignited fires. The human use of prescribed fire influenced the vegetation composition of the valley and increased the heterogeneity of vegetation patterns.

National parks have been struggling with the place of people in the landscape. Concepts like ecological integrity and adaptive management include the notion of the connection between humans and nature. However, the reality of tourism-based park economies impacts the ability of parks to incorporate active human management practices that improve the sustainability and diversity of park landscapes. Bateson (1979) described the unity between ideas about nature and the social system. Changing the perception of nature requires change in social presuppositions. National parks must change their presuppositions about the nature of wilderness if park diversity and sustainability is to exist in the future.

Ecological integrity is the current operating principle for Canadian national parks; this principle has many accompanying management issues. Defining and restoring ecological integrity are central management components for many national parks, including Jasper National Park. An intrinsic part of ecological integrity is knowledge of the historic range of variation in particular places. Landres et al. (1999) described the importance of understanding the variation in the landscape from one area to another and the processes that structured that variation. Without this knowledge park management will not be able to ascertain the integrity of park ecosystems. The landscape changes discussed in this study and depicted in the Bridgland and repeat photographs have implications for ecological integrity: just what should a landscape that has ecological integrity look like? Would this landscape resemble the one in the Upper Athabasca Valley today? Would it look like the landscape of 1915? Would it look like the landscape before the last major fire in 1889? These are difficult issues for national parks as they raise the question of the appropriateness of past management practices and current management goals.

A key factor in the restoration of ecological integrity in the Upper Athabasca Valley, and other fire adapted ecosystems, is the restoration of prescribed fire. Fire has been an elemental force of the UAV landscape. Without fire events landscape variation diminishes and the risk of great conflagrations increases exponentially. As I revealed in chapter 3 the difficulties and challenges of prescribed fire management will only increase as more time passes and more fuels accumulate.

This study has contributed to a greater understanding of Aboriginal history in the nineteenth century. It has shed some light on the complex fire history of the region. It has examined the nature of the wilderness concept and reflected on the engagement of a community with the Upper Athabasca Valley landscape.

5.2 Limitations of Study and Next Steps for Research

In an ideal world this study would have benefited from thorough historical, archaeological, paleoecological and fire history records. There were no historical records of the UAV available for the periods 1832 to 1857 and 1873 to 1907. The initial archaeological surveys in JNP took place in the 1970's and an intensive survey of the area has yet to be completed. There is little information in the archaeological record for the past 2000 years, and it is unknown whether this is due to incomplete surveys, poor preservation conditions, a lack of archaeological sites for this period, or other factors (pers. comm., J. Brink, February 18, 2003). The knowledge of archaeological history in the UAV will be augmented in future studies. The coarse scale of the existing paleoecological record makes it difficult to determine the extent of application for the nineteenth century, since the charcoal records do not adequately describe the light to medium intensity fire events. Thus, the influence of these types of fires cannot be determined through this method at this time. The fire history records are more thorough than other sources but they also require expanded studies. Current studies have not encompassed all of the UAV. The timing of fire events was the subject of one study (White, 2000) with only two sites based in JNP. The questions surrounding the anthropogenic fire-lightning ignition debate will be clarified through more fire-season studies.

Are the patterns of Aboriginal prescribed fire in the latter half of the nineteenth century representative of anthropogenic fire management in the UAV for previous centuries? My study has not answered this question. The existing dendrochronological and paleoecological studies cannot answer this question either. If these human communities wanted sustainable grassland areas, and a variable vegetation structure, then they probably used fire to maintain these areas. What seasons they burned, where they burned and how their social institutions dealt with prescribed fire are not adequately understood at this time.

There were many different directions this project could have gone. The options of a focus on spatial representation of human activities or a more defined ethnographic project would have led to different perspectives on the UAV. However, the appeal of collating diverse sources into an examination of one community's history of interaction with the landscape proved to be the most appealing.

This study would have been strengthened by a thorough ethnography of Aboriginal fire management practices in the UAV and the eastern slopes region. I wanted to interview more descendants of the Aboriginal homesteaders and other

Aboriginal communities that were in the UAV during the nineteenth century. Interviews to gather ethnobotany information for the region would have been helpful, particularly regarding the prescribed fire uses by women for gathering purposes. Interviews on the west side of the Rockies with descendants of the Secwepemc group that lived in the UAV would have provided useful information. Due to the limited scope of this project as well as financial and timing issues such interviews were not possible.

My study has demonstrated the extent of research work yet to be completed for the Upper Athabasca Valley and will hopefully inspire future researchers to delve into some of the issues only partially explored here.

5.3 Recommendations for Future Research in Jasper National Park

JNP has made significant efforts to develop research studies that help to understand the complexities and history of the region; however, most of the research based in JNP has focused on the biological and geological sciences. Social science research would be helpful in furthering an understanding of the history of JNP. Recommendations for future research in Jasper National Park include:

- Research be conducted into the settlement patterns of Aboriginal communities in the UAV, the connections between Aboriginal communities on the east and west side of the Rocky Mountains as well as the history of the Aboriginal trading routes through the mountains.
- Cooperative relations be established between existing Aboriginal communities and Jasper National Park. An open invitation for JNP to cooperate with the Aboriginal communities that traditionally used the UAV, including the Aseniwuche Winewak Nation, the Secwepemc, and the Nakoda, would be welcomed by those communities. A perspective of openness and the inclusion of the specific ways that different communities would like to be involved in JNP, whether that be in land management, tourism support, historical research or other ways to be determined by the communities and Park officials, would promote a spirit of cooperation and cause a decline in the level of alienation.
- Research projects aimed at furthering the understanding of landscape history in the UAV be initiated. Other studies would include research aimed at developing a comprehension of the soil history characteristics in the lower elevations of the UAV. Studies focused on examining the history of

grassland and forest soil types could be conducted, and in concert with other research such knowledge would advance the landscape history of the UAV.

- Research projects to expand M.P. Rogeau's fire history study to the remainder of the UAV. This would expand the knowledge of fire history, particularly for the lower intensity fires. Forest characteristic studies, such as examining the nature of tree morphology characteristics in order to determine whether the landscape was comprised of open or closed forest, would also develop the knowledge of fire and landscape history in the UAV. In addition, more season of burn studies should be conducted to expand the knowledge base gained through White's (2000) research.
- Studies aimed at quantifying the amounts of historic grassland and grassland/forest ecotones would contribute to the understanding of landscape history in the region.
- A comparison be undertaken between historic vegetation patterns and human activity in the UAV through devising digital layers on a GIS spatial analysis system.
- Determine any correlations between areas that the 1889 fire did not burn and areas utilized by the Aboriginal homesteaders or other Aboriginal communities in the UAV.
- Parks Canada revise it's perceptions and assumptions regarding the links between humans and the landscape in national parks. A worldview of people belonging to the landscape of national parks is recommended. This worldview would be a contrast to the past view of human uses as either dangerous or benign. All human actions have consequences on the landscape even non- actions such as fire suppression. This will be difficult; as described in chapter 2 the social system is supported by the ideas about nature (Bateson, 1979). Changes will be required in social presuppositions in order for change to occur in the actions and perspectives of the nature of human/landscape interactions. In my view, national parks will only be sustainable in the long term if humans have a place as manager rather than merely as seasonal tourists. If humans have a place, as individuals and communities, they will become more responsible for, and responsive to, the consequences of their actions.

Bibliography

Anderson, H.G. and A.W. Bailey. 1980. "Effects of Annual Burning on Grassland in the Aspen Parkland of east-central Alberta". *Canadian Journal of Botany*, Vol. 58.

Anderson, M. Kat. 1999. "The Fire, Pruning, and Coppice Management of Temperate Ecosystems for Basketry Material by California Indian Tribes". *Human Ecology* Vol. 27, No. 1.

Andison, D.W. 2000. *Landscape-Level Fire Activity on Foothills and Mountain Landscapes of Alberta*. Alberta Foothills Disturbance Ecology Research Series Report No. 2, Foothills Model Forest.

Aseniwuche Winewak Nation. 2001. *Cultural Awareness Presentation: Grande Cache*, copy from AWN.

Bailey, A.W. 1996. "Role of Fire in Rangeland Vegetation Dynamics". *Rangelands in a Sustainable Biosphere*. N. West (ed) Proceedings of the 5th International Rangeland Congress, Salt Lake City.

Bailey, A.W., M. Willoughby, R. Johansen, S. Smith. 1992. *Management of Yukon Rangelands*. Yukon Renewable Resources.

Baker, Lynn, Woenne-Green, Susan, and the Mutitjulu Community Uluru. 1992. "The Role of Aboriginal Ecological Knowledge in Ecosystem Management". *Aboriginal Involvement in Parks and Protected Areas, Papers presented to a conference organised by the Johnstone Centre of Parks, Recreation and Heritage at Charles Stuart University, Albury, New South Wales 22-24 July 1991.* Birckhead, J., T. De Lacy and L.J. Smith (eds). Aboriginal Studies Press, Canberra.

Bateson, Gregory. 1979. Mind and Nature: A Necessary Unity. Bantam Books, Toronto.

Beaudoin, A.B., M. Wright and B. Ronaghan. 1996. "Late Quaternary Landscape History and Archaeology in the 'Ice-Free Corridor': Some Recent Results from Alberta". *Quaternary International*. Vol. 32.

Bella, Leslie. 1987. *Parks for Profit*. Harvest House, Montreal.

Belyea, Barbara (ed.) 1994. Columbia Journals: David Thompson. McGill-Queen's University Press, Montreal & Kingston.

Berkhofer, Robert F. 1979. *The White Man's Indian: Images of the American Past from Columbus to the Present*. Vintage Books, New York.

Berkes, Fikret. 1999. *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. Taylor & Francis, Philadelphia.

Berkes, Fikret and Carl Folke. 1998."Linking social and ecological systems for resilience and sustainability". in Fikret Berkes and Carl Folke (eds) *Linking Social and Ecological Systems: Management Practices and social mechanisms for building resilience*. Cambridge University Press, Cambridge.

Borgmann, Albert. 1995. "The Nature of Reality and the Reality of Nature". *Reinventing Nature? Responses to Postmodern Deconstruction*. Michael Soule and Gary Lease (eds). Island Press, Washington.

Botkin, Daniel. 1990. *Discordant Harmonies: A New Ecology for the Twenty-first Century*. Oxford University Press, Oxford.

Boyd, Matthew. 2002. "Identification of Anthropogenic Burning in the Paleoecological Record of the Northern Prairies: A New Approach". *Annals of the Association of American Geographers*, Vol. 92, No. 3.

Brinks, Jack. 1986. *An Introduction to the Archaeology of the Grande Cache Region in the Northern Alberta Rocky Mountains*. Unpublished report, Final Report, Archaeological Survey of Alberta.

Buell, Lawrence. 1995. The Environmental Imagination: Thoreau, Nature Writing, and the Formation of American Culture. Belknap Press of Harvard University Press, Cambridge.

Campbell, Sandy and Eric Higgs, Samantha James and Nicola Miller. 2000. *Human Activity in the Upper Athabasca Valley*. CD-Rom, Culture, Ecology and Restoration: an interdisciplinary Research Project.

Canada National Parks Act. 2000. An Act respecting the national parks of Canada

Canadian Parks Service. 1989. *Keepers of the Flame: Implementing fire management in the Canadian Parks Service*. National Resources Branch, Canadian Parks Service.

Chen, Jiquan, Sari C. Saunders et al. 1999. "Microclimate in Forest Ecosystem and Landscape Ecology". *Bioscience* Vol. 49, No. 4.

Cole, David N. and Peter B. Landres. 1996. "Threats to Wilderness Ecosystems: Impacts and Research Needs". *Ecological Applications*, Vol. 6 No. 1.

Cronon, William. 1995. "The Trouble with Wilderness; or, Getting Back to the Wrong Nature". *Uncommon Ground*. William Cronon (ed). W.W. Norton & Company, New York.

Cronon, William. 1990. "Modes of Prophecy and Production: Placing Nature in History". *Journal of American History*. Vol. 76, No. 4.

Crumley Carole. 1994. "Historical Ecology: A Multidimensional Ecological Orientation". *Historical Ecology: Cultural Knowledge and Changing Landscapes*. Carole Crumley (ed). School of American Research Press, Sante Fe.

Deloria, Jr., Vine 2001. "American Indians and the Wilderness". *Return of the Wild: the Future of our Natural Lands*. Ted Kerasote (ed). Island Press, Washington.

Dempsey, Hugh A.1998. *Indians of the Rocky Mountain Parks*. Fifth House Publishers, Calgary.

Department of the Interior. Annual Report, 1887. Sessional Papers No. 14.

Department of the Interior. Annual Report, 1888. Sessional Papers No. 14.

Department of the Interior. Annual Report, 1889. Sessional Papers No. 14.

Department of the Interior. Annual Report, 1894. Sessional Papers No. 13.

Department of the Interior. Annual Report, 1897. Sessional Papers No. 13.

Department of the Interior. Annual Report, 1907. Sessional Papers No. 25.

Department of the Interior. Annual Report, 1912. Sessional Papers No. 25.

Department of the Interior. Annual Report, 1913. Sessional Papers No. 25.

Department of the Interior. Annual Report, 1920. Sessional Papers No. 25.

Department of the Interior. Annual Report, 1924. Sessional Papers No. 25.

Department of the Interior. Annual Report, 1929. Sessional Papers No. 25.

Desjarlais, Mary. 2000. *Interview with Mary Desjarlais by the Aseniwuche Winewak Nation of Canada.*

Desjarlais, Mary. 2002. *Interview with Mary Desjarlais by Patricia Bailey.*

Devall, Bill. 1994. "The Deep Ecology Movement". *Key Concepts in Critical Theory: Ecology.* Carolyn Merchant (ed), Humanities Press, New Jersey.

Devall, Bill and George Sessions. 1985. *Deep Ecology: Living as if nature mattered.* Peregrine Smith Books, Salt Lake City.

Douglas, David.1959. Journal kept by David Douglas during his travels in North America 1823-1827. Antiquarian Press Ltd., New York.

Egan, D. and E. Howell. 2001. "Introduction." in *The Historical Ecology Handbook: A Restorationist's Guide to Reference Ecosystems.* (eds) Dave Egan and Evelyn A. Howell, Island Press, Washington.

Ens, G. and B. Potyondi. 1986. *A History of the Upper Athabasca Valley in the Nineteenth Century.* Report for Parks Canada.

Francis, Peter D.1994. Archaeological Fieldwork Programme End-of Season Report Jasper National Park. Report for Parks Canada.

Freeman, M.M.R. 1992. "The Nature and Utility of Traditional Ecological Knowledge". *Northern Perspectives,* Vol. 20 No. 1.

Gainer, Brenda. 1981. *The Human History of Jasper National Park.* Report for Parks Canada.

Geiger, Rudolf.1965. *The Climate Near the Ground.* Harvard University Press, Cambridge.

Graber, David M. 1995. "Resolute Biocentrism: The Dilemma of Wilderness in National Parks". *Reinventing Nature?: Responses to Postmodern Deconstruction.* Michael Soule and Gary Lease (eds). Island Press, Washington D.C.

Harmon, Daniel. 1911. *A Journal of Voyages and Travels in the Interior of North America: between the 47th and 58th degrees Latitude, Extending from Montreal nearly to the Pacific, a Distance of About 5,000 Miles.* The Courier Press, Limited, Toronto.

Harris, Marvin. 1974. *Cows, Pigs, Wars and Witches: the Riddles of Culture.* Random House, New York.

Hayles, N. Katherine. 1995. "Searching for Common Ground". *Reinventing Nature?: Responses to Postmodern Deconstruction*. Michael Soule and Gary Lease (eds). Island Press, Washington D.C.

Heathcott, Mark. 1999. "Lightning and Lightning Fire: Central Cordillera, Canada." *Research Links*, Vol. 7, No. 3.

Heathcott, Mark. 1995. Memorandum to Wardens Taylor, Wesbrook, Otway and Kubian re: lightning fires in Jasper National Park. CER files Tb-50 library.

Higgs, Eric. 1997. "What is Good Ecological Restoration?". *Conservation Biology*, Vol. 11 No. 2.

Higgs, Eric. 2000. "Nature by Design." in *Technology and the Good Life?* (eds) Eric Higgs, Andrew Light, David Strong. University of Chicago Press, Chicago.

Higgs, Eric. 2002. *Nature By Design*. M.I.T. Press, Cambridge.

Higgs, Eric, Sandy Campbell, Ian MacLaren, Julian Martin, Tim Martin, Carol Murray, Andie Palmer and Jeanine Rhemtulla. 1999. *Culture, Ecology and Restoration in Jasper National Park.* Culture, Ecology and Restoration Report.

Holland, W.D. and G.M. Coen. 1982. *Ecological (Biophysical) Land Classification of Banff and Jasper National Parks.* Volume II: Soil and Vegetation Resources. Alberta Institute of Pedology Publication No. SS-82-44, Edmonton, Alberta.

Holochek, J.L., Pieper, R.D. and C. H. Herbel. 1989. *Range Management Principles and Practices*. Prentice Hall, Englewood Cliffs.

Hudecek-Cuffe, Caroline. 1998. Final Report Department of Anthropology, University of Alberta, Archaeological Field School Jasper National Park, July 15-August 20, 1997. Report prepared for Parks Canada, Canadian Heritage, Western Region.

Hunn, Eugene S. 1990. *Nch'i-Wana "The Big River": Mid-Columbia Indians and Their Land.* University of Washington Press, Seattle.

Ingold, Tim. 2000. *The Perception of the Environment: Essays in livelihood, dwelling and skill.* Routledge, London.

Irving, Barry D. 2001. *The Impacts of Horse Grazing on Conifer Regeneration in West-Central Alberta*. PhD Thesis, University of Alberta.

James, Malcolm. 1986. "Obsidian Source Analysis for Banff and Jasper National Parks, Alberta". *Eastern Slopes Prehistory: Selected Papers*. Brian Ronaghan (ed). Archaeological Survey of Alberta, Occasional Paper No. 30.

Johnson, E. and C. Larsen. 1991. "Climatically Induced Change in Fire Frequency in the Southern Canadian Rockies". *Ecology*, Vol. 72, No. 1.

Kay, C.E., Patton, B., and White, C.A. 1994 *Assessment of long-term terrestrial ecosystem states and processes in Banff National Park and the Central Canadian Rockies.* Banff National Park, Resource Conservation, Parks Canada.

Keller, R. and M. Turek. 1998. *American Indians and National Parks*. University of Arizona Press, Tucson.

Krech III, Shepard. 1999. *The Ecological Indian: Myth and History*. W.W. Norton & Co. New York.

Kottak, Conrad P. 1999. "The New Ecological Anthropology." *American Anthropologist*, Vol. 101, No. 1.

Kubian, Rick. 1995. Memorandum to Mark Heathcott re:lightning fires in Jasper National Park. CER files Tb-50 library.

Lamb, W. Kaye. 1969. *Journal of a Voyage on the North West Coast of North America during the years 1811, 1812, 1813, and 1814 by Gabriel Franchere*. The Champlain Society, Toronto.

Landres, Peter. B. 1992. "Temporal Scale Perspectives in Managing Biological Diversity". *Transactions of the 57th North American Wildland and Natural Resources Conference*.

Landres, Peter B., Penelope Morgan and Frederick J. Swanson. 1999. "Overview of the Use of the Natural Variability Concepts in Managing Ecological Systems." *Ecological Applications*, Vol. 9, No. 4.

Lewis, H.T. 1985 "Why Indians Burned: Specific Versus General Reasons" in Lotan, J.E., Kilgore, B.M., Fischer, W.C., Mutch, R.W. (eds), *Proceedings, Symposium and Workshop on Wilderness Fire*. Intermountain Forest and Range Experiment Station, Forest Service, US Department of Agriculture, Missoula, Montana.

Lewis, Henry T, and Theresa A. Ferguson. 1988 "Yards, Corridors and Mosaics: How to Burn a Boreal Forest." *Human Ecology*, Vol. 16, No. 1.

Lewis, H.T. 2002. "Introduction". in Stewart, Omer C. *Forgotten Fires: Native Americans and the Transient Wilderness*. Henry T. Lewis and M. Kat Anderson (eds). University of Oklahoma Press, Norman.

Lopoukhine, N. and White C. 1985. *Fire Management Options in Canada's National Parks*. Proceedings of the Intermountain Fire Council 1983 Fire Management Workshop, D.E. Dube (ed), Canadian Forestry Service.

Lothian, W.F. 1987. *A Brief History of Canada's National Parks*. Environment Canada, Parks.

Luckman, B. H., M.S. Kearney, A. Bowyer-Beaudoin, K. Holland. 1979. *Holocene Environmental Change in Jasper National Park*. Second Interim Report, Parks Canada.

Luckman, B, and Kavanagh, T. 2000. "Impact of Climate Fluctuations on Mountain Environments in the Canadian Rockies". *Ambios*, Vol. 29 No. 7.

MacCallum, Beth. 1989. *Assessment of Fire Effects on Vegetation and Wildlife of the Henry House Prescribed Fire, Jasper National Park, Interim Report*. Natural Resource Conservation, Canadian Parks Service, Western Region.

MacLaren, I.S. 1999. "Cultured Wilderness in Jasper National Park". *Journal of Canadian Studies*, Vol 34 No. 3.

MacDonald, Kubian, Westhaver. 1999. *Syncline Ridge Prescribed Burn Plan*. Report prepared for Parks Canada.

Marshall, A.G. 1999. "Unusual Gardens: The Nez Perce and Wild Horticulture on the Eastern Columbia Plateau." in *Northwest Lands, Northwest Peoples: Readings in Environmental History* (eds) Dale D. Goble and Paul W. Hirt, University of Washington Press, Seattle.

Mayr, Ernst. 1982. *The Growth of Biological Thought: Diversity, Evolution and Inheritance*. Belknap Press, Cambridge, Mass.

McBride, J.R. and Lewis, H.T. 1984. "Occurrence of Fire Scars in Relation to the Season and Frequency of Surface Fires in Eucalyptus Forests of the Northern Territory, Australia". *Forest Science*. Vol. 30 No. 4.

Mercer, George. 1995. *Draft Response - Principles for the Management of Vegetation in Canadian Mountain Parks.*

Merchant, Carolyn. 1995. "Reinventing Eden: Western Culture as Recovery Narrative". in *Uncommon Ground*. William Cronon (ed). W.W. Norton & Company, New York.

Merk, Frederick (ed.) 1931. *Fur Trade and Empire: George Simpson's Journal*. Harvard University Press, London.

Milton, Viscount and W.B. Cheadle. 1901. *The North-West Passage by Land: being a Narrative of an Expedition from the Atlantic to the Pacific.* Cassell and Co. Ltd., London.

Miyanishi, Kiyoko and E.A. Johnson, S.L. Gutsell, M.B. Dickinson and R.D. Revel. 2000. "Lightning, Lightning Fires and Fire Frequency in the Central Rockies." *Research Links*, Vol. 8, No. 3.

Moberly, Edward. (EM). 1980. *Interview with Edward Moberly by Peter Murphy*. Transcript received from P. Murphy.

Moberly, George. (GM) 1999. *Interview with George Moberly by the Aseniwuche Winewak Nation of Canada.*

Moberly, Myles. (MM) 1999. *Interview with Myles Moberly by the Aseniwuche Winewak Nation of Canada.*

Moberly, Roddy. (RM) 1999. *Interview with Roddy Moberly by the Aseniwuche Winewak Nation of Canada.*

Moberly, Walter. 1872. *Journal of Canadian Pacific Railway Preliminary Survey*. British Columbia Archives, copy from Culture, Ecology, and Restoration files, University of Alberta.

Moran, Emilio F. 1990. "Ecoystem Ecology in Biology and Anthropology: A Critical Assessment". *The Ecosystem Approach in Anthropology: From Concept to Practice*. Emilio F. Moran (ed). University of Michigan Press, Ann Arbor.

Moran, Emilio F. 2000. *Human Adaptability: An Introduction to Ecological Anthropology*. Westview Press, Boulder.

Nabokov, P. and Loendorf, L. 1999. *Restoring a Presence: A Documentary Overview of Native Americans and Yellowstone National Park*. Prepared for the National Parks Service.

Nicks, Trudy. 1978. "The Iroquois and the Fur Trade in Western Canada". *Old Trails and New Directions: Papers of the Third North American Fur Trade Conference*. Carol M. Judd and Arthur J. Ray (eds). University of Toronto Press, Toronto.

Nicks, Gertrude C. 1980. *Demographic Anthropology of Native Populations in Western Canada, 1800-1975.* PhD Thesis, Department of Anthropology, University of Alberta.

Noss, Reed F and Allen Y. Cooperrider. 1994. *Saving Nature's Legacy: Protecting and Restoring Biodiversity*. Island Press, Washington.

Nuttall, Mark. 2000. "Indigenous Peoples, self-determination and the Arctic Environment". in *The Arctic: Environment, People, Policy*. Mark Nuttall and Terry Callaghan (eds.) Harwood academic publishers, Singapore.

Oelschlaeger, Max. 1991. *The Idea of Wilderness*. Yale University Press, New Haven.

Ortiz, Bev 1993. "Contemporary California Indian Basketweavers and the Environment". *Before the Wilderness: Environmental Management by Native Californians*. (eds) Thomas C. Blackburn and Kat Anderson, Ballena Press.

Palliser, John. 1969. *Papers Relative to the Exploration by Captain Palliser of that Portion of British North America which lies between the Northern Branch of the River Saskatchewan and the frontier of the United States; and between the Red River and Rocky Mountains*. Greenwood Press, New York.

Parks Canada. 1999. *State of Protected Heritage Areas*.

Parks Canada. 2000a. *Jasper National Park of Canada: Management Plan*.

Parks Canada. 2000b. *Panel for the Report on Ecological Integrity in Canada's National Parks*.

Parks Canada. 2001. *Three Valley Confluence: Restoration Framework Jasper National Park*.

Parks Canada. 2002. *An Agreement for the Establishment of a National Park on Banks Island*.

Parks Canada. 2002. *The Tuktut Nogait Agreement: An Agreement to Establish a National Park in the Inuvialuit Settlement Region near Paulatuk, Northwest Territories*.

Parks Canada. 2002. *Draft of National Standard Operating Procedures Manual*.

Parks Canada Website. http://www.parkscanada.ca.

Patterson, Thomas C. 1994. "Toward a Properly Historical Ecology". *Historical Ecology: Cultural Knowledge and Changing Landscapes*. Carole Crumley (ed). School of American Research Press, Santa Fe.

Plumwood, Val. 1994. "Ecosocial Feminism as a General Theory of Oppression". *Key Concepts in Critical Theory: Ecology*. Carolyn Merchant (ed), Humanities Press, New Jersey.

Provincial Archives of Alberta (PAA). Accession # 79.27 file 11005. 1908. *Diary of Arthur St. Cyr, Dominion Land Surveyor*.

Provincial Archives of Manitoba (PAM). HBC B.94/a/1. *Jasper House Journal 1828-1829*.

Provincial Archives of Manitoba (PAM). HBC B.94/a/2. *Jasper House Journal 1829-1830*.

Provincial Archives of Manitoba (PAM). HBC B.94/a/3. *Jasper House Journal 1830-1831*.

Rappaport, Roy A. 1999. *Ritual and Religion in the Making of Humanity*. Cambridge University Press, Cambridge.

Rhemtulla, Jeanine Marie 1999. *Eighty Years of Change: The Montane Vegetation of Jasper National Park*. M.Sc. Thesis, University of Alberta.

Rogeau, Marie-Pierre. 1999. *Detailed Disturbance History Mapping of the Montane, Jasper National Park 1997-1998*. Report prepared for Foothills Model Forest.

Rogeau, M.P., M.J. Fortin and I. Pengelly. 2002. *Using a Topography Model to Map Historical Fire Cycles and Monitor Current Fire Cycles in Banff National Park*. Report prepared for Parks Canada.

Rohatinsky, Virginia (VR). 2000. *Inteview with Virginia Rohatinsky by the Aseniwuche Winewak Nation of Canada*.

Russell, Dale R. 1991. *Eighteenth-Century Western Cree and their Neighbours*. Archaeological Survey of Canada, Mercury Series, Paper 143.

Rylatt, R.M. 1991. *Surveying the CPR: Memoir of a Railroad Pioneer*. University of Utah Press, Salt Lake City.

Society for Ecological Restoration Science & Policy Working Group. 2002. *The SER Primer on Ecological Restoration*. www.ser.org/.

Spence, Mark. D. 1999. *Dispossessing the Wilderness: Indian Removal and the Making of the National Parks*. Oxford University Press, Oxford.

Spry, Irene. 1963. *The Palliser Expedition: An account of John Palliser's British North American Expedition 1857-1860*. The MacMillan Co., Toronto.

Spry, Irene (ed). 1968. *The Papers of the Palliser Expedition, 1857-1860*. Champlain Society, Toronto.

Steward, Julian F. 1955. *Theory of Culture Change: the Methodology of Multilinear Evolution*. University of Illinois Press, Chicago.

Stewart, Edgar and Jane Stewart. 1957. *The Columbia River: Or scenes and adventures during a residence of six years on the western side of the Rocky Mountains among various tribes of Indians hitherto unknown; together with 'A Journey across the American Continent' by Ross Cox*. University of Oklahoma Press, Norman.

Stewart, Omer. 1954. "The Forgotten Side of Ethnogeography". *Method and Perspective in Anthropology, Papers in honor of Wilson D. Wallis*. Robert F. Spencer (ed.). University of Minnesota Press, Minneapolis.

Stringer, P.W. 1973. "An Ecological Study of grasslands in Banff, Jasper and Waterton Lakes National Parks". *Canadian Journal of Botany*, Vol. 51.

Tande, G.F. 1977 *Forest fire history around Jasper townsite, Jasper National Park, Alberta*. M.Sc. Thesis, Univ. of Alberta.

Taylor, C.J. 1990. *Negotiating the Past: The Making of Canada's National Historical Parks and Sites*. McGill-Queen's University Press, Montreal.

Teit, James. 1900. "The Shuswap". *The Jesup North Pacific Expedition*, Franz Boas (ed), Vol. 2 part 7.

Thomson, Don W. 1966. *Men and Meridians: The History of Surveying and Mapping in Canada*. Vol. 2 1867 to 1917. Queen's Printer, Ottawa.

Turner, Nancy J. "Time to Burn: Traditional Use of Fire to Enhance Resource Production by Aboriginal Peoples in British Columbia". *Indians, Fire and the Land*. Robert Boyd (ed.). Oregon State University Press, Corvalis.

VanWagner, C.E. 1995. *Analysis of the Fire History for Banff, Jasper and Kootenay National Parks*. Report for Parks Canada, Natural Resources Branch.

Vayda, Andrew P. 1969. "Introduction". *Environment and Cultural Behavior: Ecological Studies in Cultural Anthropology*. Andrew P. Vayda (ed). Natural History Press, Garden City.

Vayda, Andrew P. 1973. *An Ecological Approach In Cultural Anthropology*. Warner Modular Publication, Reprint 359, Andovar.

Wall, G., S. Hallman and A. Skibicki. 1995. *Shared and Co-operative Management Models of National Parks and National Historic Sites between Governments and Aboriginal Peoples: An International Comparative Review*. Prepared for the Department of Canadian Heritage.

Wanyandie, Irene Mary.(IMW) 1999. *Interview with Irene Mary Wanyandie by the Aseniwuche Winewak Nation of Canada*.

Westworth, D.A., and L.M. Brusnyk.1988. *An Investigation of Backcountry Horse Use and Grazing Capacity in Jasper National Park*. Parks Canada, Western Region.

White, Clifford A. 2000. "Chapter 3. Fire History of Montane Meadows." PhD Thesis, University of British Columbia. Chapter sent by the author.

White, C.A., M.C. Feller and P. Vera. 2002. "New Approaches for Testing Fire History Hypotheses in the Canadian Rockies". *Managing Protected Areas in a Changing World, Proceedings of the Fourth International Conference on Science and Management of Protected Areas*. S. Bondrup-Nielsen, N.Munro, G. Nelson, J. Martin Willison, T. Herman and P. Eagles (eds).

White, P.S. and J.L. Walker. 1997. "Approximating Nature's Variation: Selecting and Using Reference Information in Restoration Ecology". *Restoration Ecology*. Vol.5, No. 4.

Willoughby, M.G., M.J. Alexander and K. Sundquist. 2001. *Range Plant Community Types and Carrying Capacity for the Montane Subregion*. Fourth Approximation. Environmental Protection, Land and Forest Service.

Worster, David. 1977. *Nature's Economy: The Roots of Ecology*. Sierra Club Books, San Francisco.

Wright, H.A., and Bailey, A.W. 1982 *Fire Ecology: United States and Southern Canada*. John Wiley & Sons., New York.

Wuorinen, Richard. 1997. *A History of Grande Cache*. Grande Cache Historical Society.

Appendix 1. Native Plant Species of the Upper Athabasca Valley

The tree species include: lodgepole pine (*Pinus contorta*), white spruce (*Picea glauca*), black spruce (*Picea mariana*), Douglas-fir (*Pseudotsuga menziesii*), and trembling aspen (*Populus tremuloides*).

Shrubs include: buffaloberry (soapberry) (*Shepherdia canadensis*), red-osier dogwood (*Cornus stolonifera*), high-bush cranberry (*Viburnum opulus)*, shrubby cinquefoil (*Potentilla fruticosa*), wild rose (*Rosa acicularis*), wild gooseberry (*Ribes spp.*), saskatoon (*Amelanchier alnifolia*), prickly juniper (*Juniperus communis*), creeping juniper (*Juniperus horizontalis*).

The herbaceous plants include: wild strawberry (*Fragaria virginiana*), bearberry (kinnikinnik) (*Arctostaphylos uva-ursi*), yarrow (*Achillea millefolium*), cow parsnip (*Heracleum lanatum*), Western wood lily (*Lilium philadelphicum*), red paintbrush (*Castilleja miniata*), common fireweed (*Epilobium angustifolium*), prairie crocus (*Anemone patens*), wild chive (*Allium schoenoprasum*), and wild vetch (*Vicia americana*).

Grass and grass-like species present include: purple reedgrass (*Calamagrostis purpurascens*), slender wheatgrass (*Agropyron trachycaulum*), junegrass (*Koeleria macrantha*), hairy wild rye (*Elymus innovatus*), and a variety of sedges (*Carex spp.*).